

Cristie Bare Machine Recovery for TSM

User Guide

August 2010



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1 Overview

1.1 Context

This document describes the essential elements of TBMR and Disaster Recovery based upon a tailored WinPE recovery module. It is based upon version 6.3 of the software.

1.2 Prerequisites

An Intel x86, x64 or ia64 based processor, with 640MB RAM (1GB for Vista or later OS's) and 20MB free disk space running one of the following operating systems:

- Windows XP
- Windows 2003
- Windows Vista
- Windows 7
- Windows 2008
- Windows 2008 R2

Both 32 and 64-bit versions of XP, 2003, Vista, 7 and 2008 (including Core and R2) are supported. On Itanium (ia64) only Windows 2003, 2008 and 2008 R2 are supported.

TBMR requires a minimum TSM client version of 5.5.x.x on x86/x64/ia64. This must be installed and correctly configured prior to the installation of TBMR. Windows 2008 R2 requires a minimum client version of 6.1.2.0.

Ensure that either the BA Client Open File Support is installed and configured correctly. Select either LVSA or VSS as appropriate. This allows important OS files that are normally held open by the OS to be successfully backed up by TSM. TBMR will not successfully recover the OS without these files.

1.3 Backup Process

Cristie Bare Machine Recovery for IBM Tivoli (TBMR) allows you to perform a bare machine recovery of your system direct from an IBM Tivoli Storage Manager (TSM) backup.

To do this you must first prepare your system using the process outlined below.

- 1 Installation (refer to the TBMR Installation and Licensing Guide)
 - Install the TBMR configuration software
 - License the Software (using a Trial or Full license) Using a TSM Backup for Disaster Recovery (page 12, page 4, page 7)
- 2 Configuration
 - Save the Configuration parameters. Update when significant hardware changes are made.
 - Ensure that you have a bootable media (normally the WinPE DR CD-ROM).
- 3 Backup system and user data
 - Perform regular standard TSM backups (page 7) as required.

You will then be ready to *Restore the system from the Disaster Recovery Backup (page 12)*.

1.4 Recovery Process

In the event of a disaster, having previously taken a TSM backup of the system and stored the configuration information, Windows PE mode DR enables you to restore your system to the state at the last TSM backup.

The TBMR recovery console is supplied on CD-ROM and if your machine supports bootable CD-ROMs (most PCs do) this is the most convenient way to boot the DR module. If the system does not support bootable CD-ROMs you can boot from the network. Contact Cristie for details on how to set this up.

Windows PE offers several advantages namely:

- a familiar Windows GUI
- the ability to inject new mass storage drivers during the boot process
- all variations of dynamic disks are supported (i.e. mirrored, spanned, striped and RAID-5)
- NTFS volumes/partitions are created natively
- support for NTFS mounted folders (junctions) and hard links
- the restored backup contains the original file security information

The WinPE recovery process has 5 main steps

- 1** Load Configuration data
- 2** Rebuild storage devices (hard disks)
- 3** Restore OS files from a TSM backup
- 4** Dissimilar Hardware (if necessary)
- 5** Boot into Windows

2 The TBMR Create Configuration Tool

Configuration information is saved by default to the *TBMRCFG* folder on the Windows system partition. This cannot be changed.

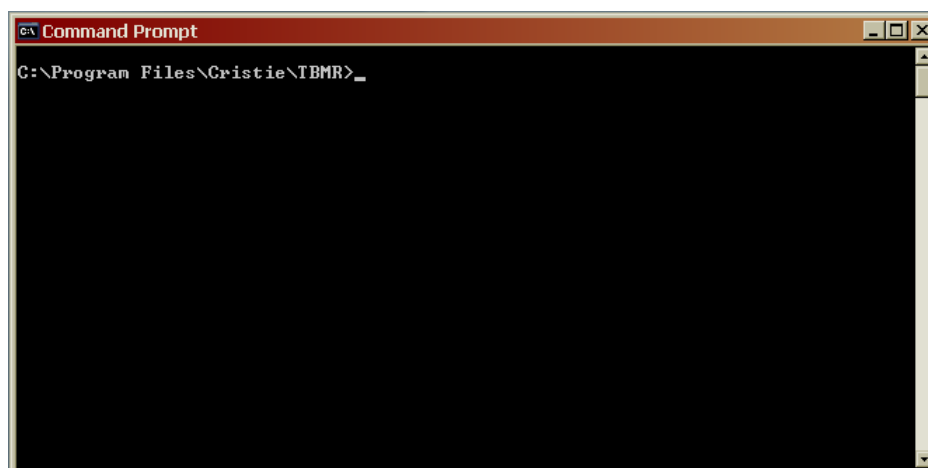
The Cristie tool that provides this function is called *TBMRCfg.exe* which is located in the TBMR installation folder (normally *Program Files \Cristie\TBMR*). This is a command line only tool which is licensed for use initially for a 30 day trial period. A full license is required to use the program beyond the trial period.

As part of this process, details about the hard disks, operating system, storage controller(s), network adapter(s) and network settings will be queried and stored. You can override some of these details if you wish.

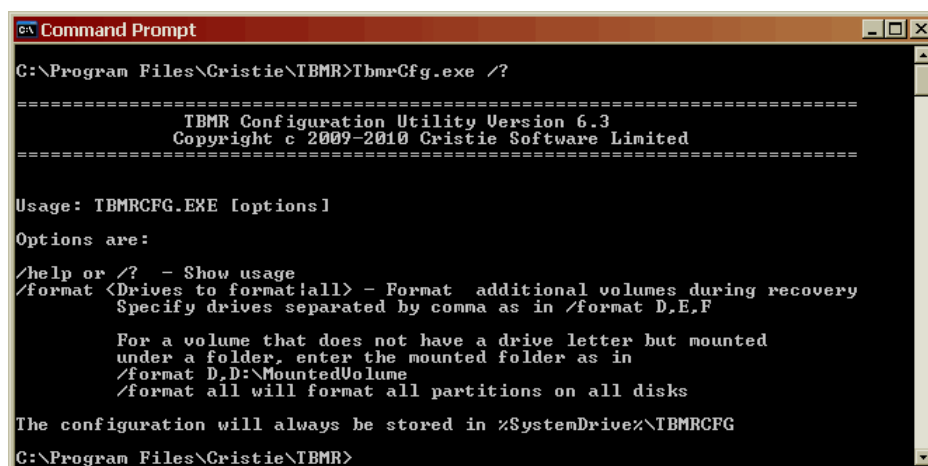
The next sections discuss this process in more detail.

2.1 Creating the Configuration Information

To create the configuration manually run a command window and navigate to the folder where TBMR is installed. For example,



The TBMR configuration program is called *TbmrCfg.exe*. Enter the command *TbmrCfg.exe /?*. This will display the command line options available.



The command line options are very simple:

/help or /?

Shows *TbmrCfg* usage. This displays the command option summary.

`/format <Drives to format | all>`

The `/format` option allows disk volumes other than the Windows drive to be formatted during the recovery. By default only the Windows volume will be formatted. There is an exception to this if Windows is not contained within the first partition of the disk. In that case both the Boot partition and the Windows partition will be configured for formatting. However, regardless of this setting, the WinPE based recovery environment will allow any or all partitions to be formatted.

So, for example, if volumes D:, E: and F: are to be additionally formatted during recovery, enter:

```
TbmrCfg.exe /format D,E,F      (separate the drive letters using a comma)
```

Enter the following to back up all partitions on all drives on the system:

```
TbmrCfg.exe /format all
```

Volumes mounted on local folders not having a drive letter can be specified like this:

```
TbmrCfg.exe /format D:\MountedVolume
```

where `D:\MountedVolume` is the folder mount point. An example using both normal partitions and a mounted volume is:

```
TbmrCfg.exe /format D,D:\MountedVolume
```

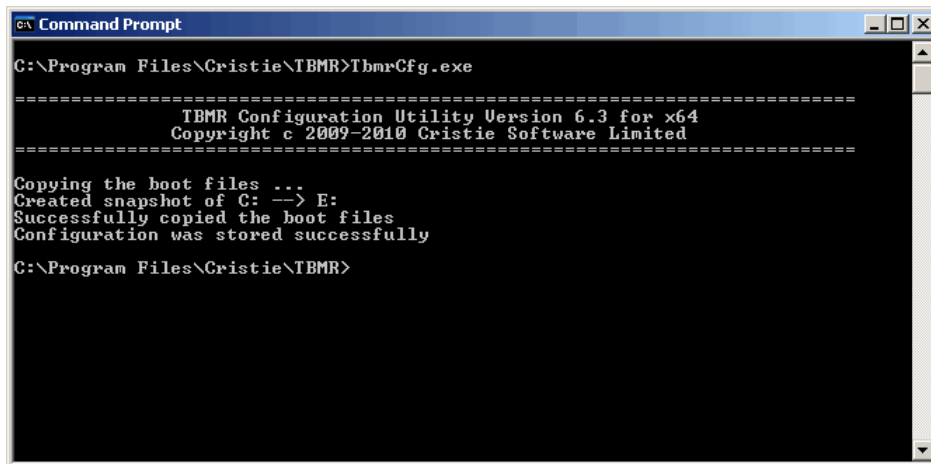
TbmrCfg stores the configuration in `%SystemDrive%\TBMRCFG` folder (`%SystemDrive%` is the drive associated with the Windows folder, usually C:\). This location cannot be changed.

NOTE: It is important to remember that the TBMR configuration must be created before the BA Client backup is made. Cristie suggests that this is done by creating a job to run on the TSM Scheduler containing a script that calls the TbmrCfg.exe program installed in the TBMR installation folder.

3 64-bit Versions of Windows XP, Vista, Windows 7, 2003 and 2008

On these 64-bit OS's, files additional to the standard TSM backup dataset must be copied and saved. These include boot files and SystemState objects which are not normally backed up by the BA Client on these OS's.

Some of the additional files backed up are also locked at the time of backup and must be backed up using the Open File Manager VSS. So when TBMRCfg runs it invokes VSS to take a snapshot copy of these extra files (see below).



```
Command Prompt
C:\Program Files\Cristie\TBMR>Tbmrcfg.exe

=====
          TBMR Configuration Utility Version 6.3 for x64
      Copyright c 2009-2010 Cristie Software Limited
=====

Copying the boot files --.
Created snapshot of C: --> E:
Successfully copied the boot files
Configuration was stored successfully

C:\Program Files\Cristie\TBMR>
```

4 Using a TSM Backup for Disaster Recovery

TBMR allows a previously created TSM backup or backupset to be used as a DR backup.

As long as the TBMR configuration has been created (see previous section) and a TSM backup is performed afterwards, then it will be possible to recover the system using the DR environment.

This document does not describe how to create TSM backups. Please refer to your TSM Administrator's Guide for details.

5 Encrypted Backups

TBMR supports encrypted TSM backups. This can be enabled in TSM by adding the line:

```
INCLUDE.ENCRYPT "*" : \ . . . \ *
```

to the dsm.opt file. TBMR works by creating the system configuration into the folder TBMRCFG. So the line above would mean that when the TSM backup is created, the TBMRCFG folder is also encrypted. This is not a problem though, but would mean that you will be prompted for the password during the recovery. If you wish to avoid this prompt add this additional line to dsm.opt after the line above:

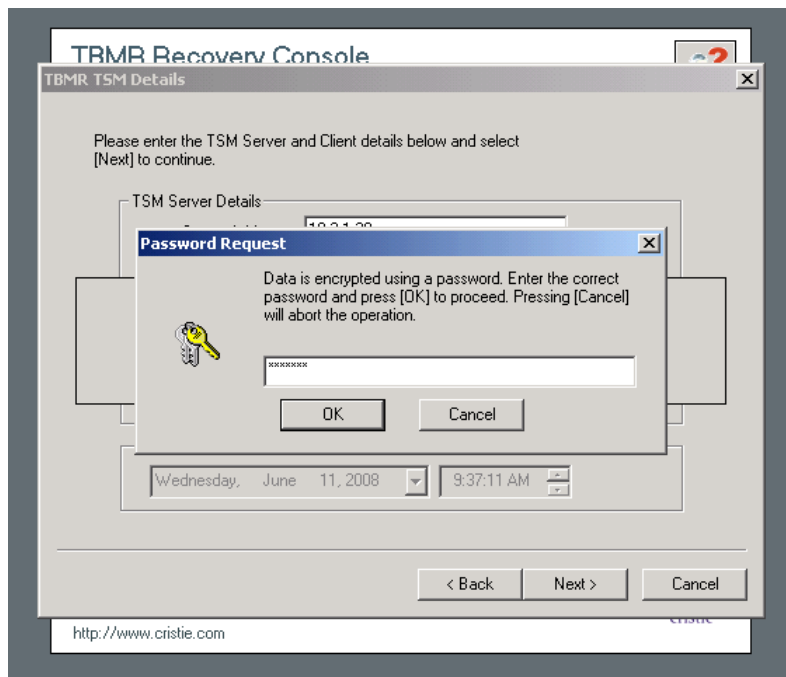
```
EXCLUDE.ENCRYPT "*" : \TBMRCFG\ *
```

You can also choose to always prompt for the encryption key password or have it stored locally. You will be prompted for the encryption key thus:



You should also select the appropriate encryption algorithm for your backup.

If the folder containing the TBMR configuration has been encrypted then during the recovery you will be prompted for the password:



If the configuration folder has been excluded from the encryption (as described above) you will be prompted for the password during the 'Restore Files' phase of the DR.

Please enter the same password you entered during the backup.

Note: If you have elected to have the password stored locally (via the BA Client Preferences menu) and the TBMR configuration has been created post this change, then you will not be prompted for the password during the recovery.

You may also need to perform a 'dummy' backup first to get the password stored locally before generating the TBMR configuration.

6 Image Backups

TBMR supports TSM backups of the form incremental, image and backupsets. However, for image backups, it is essential that in addition to the image backup, an incremental backup of the TBMRCFG folder is made to the same Node.

This is because it is not possible to retrieve the configuration details from an image backup.

If this extra incremental backup is not made then it will not be possible to perform a DR.

Note also that it is not possible to restore an image backup to a smaller disk partition

7 Backupsets

TBMR now supports DR recovery from TSM backupsets. At the moment TBMR only supports *online* backupsets (i.e. those maintained in a Node on a TSM server). Typically a backupset is created with a `dsmadm` command such as:

```
Generate Backupset <Nodename> <Prefix> Description="This is a
backupset test" Retention=Nolimit Wait=Yes Datatype=File TOC=Yes
DevClass=File
```

Where <Nodename> is the name of the node on the TSM server, <Prefix> is a short prefix to add to the backupset name.

Note that a backupset is created from a backup already present in the specified node. If this backup does not already contain a backup of the TBMRCFG folder generated by the TBMRCfg program, it will not be possible to recover the system from the backupset.

Note that it is essential to specify TOC=Yes. TBMR cannot recover a backupset created without a TOC (Table of Contents).

8 Restoring your System

If the situation arises where you need to recover your system, you have all the necessary information on the DR System CD, the DR Configuration Disk (or file) and the TSM Backup to get your system up and running in minimal time. The restore process requires little user intervention.

8.1 Booting the DR Console from CD-ROM

Insert the bootable DR CD-ROM and reset the machine. You will be initially prompted to:

Press any key to boot from CD.....

This prompt is only made for a few seconds before the system will attempt to boot the underlying OS, so you will need to react quickly!

Early on in this process you will be prompted to optionally inject new Mass Storage (disk) drivers if required (this will be useful during dissimilar recovery) by pressing **F6**. Ignore this option if no new drivers are required. Again, this prompt is only displayed for a few seconds.

Finally the WinPE RamDisk image will be loaded from the CD. When the WinPE system has booted it is possible to remove the CD if you wish.

8.2 WinPE Based TBMR Recovery Console

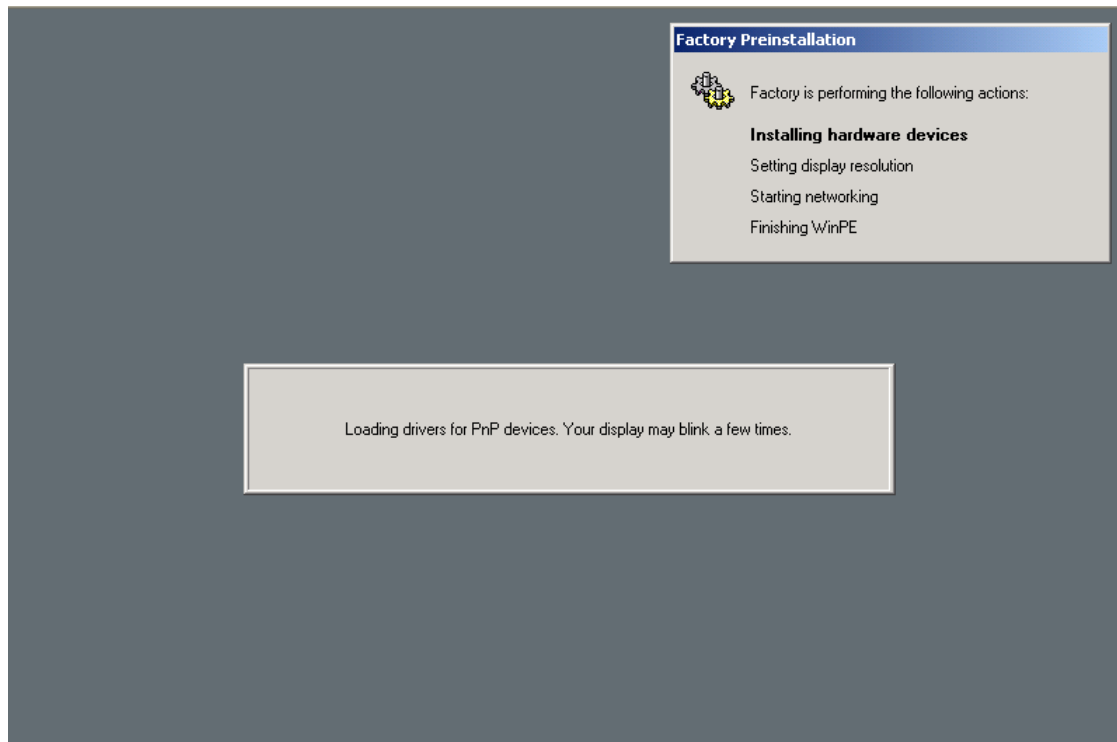
When the WinPE TBMR Console is booted, a Windows installation-like boot procedure is started.

Early on in this process you will be prompted to optionally inject new Mass Storage (disk) drivers if required (this will be useful during dissimilar recovery) by pressing **F6**. Ignore this option if no new drivers are required. This prompt is only displayed for a few seconds.

Finally the WinPE RamDisk image will be loaded from the CD. When the WinPE system has booted it is possible to remove the CD if you wish.

Upon successful boot a Plug and Play sequence will run to determine the installed devices - in particular the Mass Storage devices and Network Adapters. At this point the screen may blink a few times whilst the Display Adapter is detected.

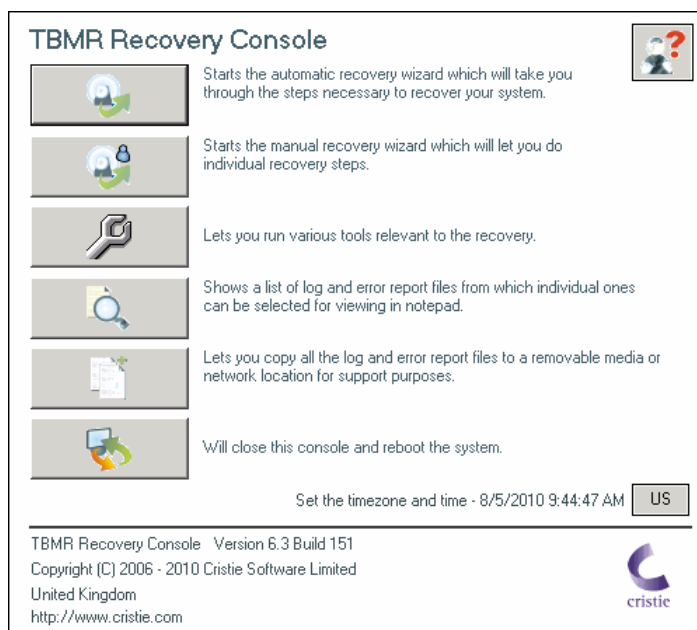
Note that the DR Console will automatically reboot 24 hours after starting. This is an operating restriction of the Microsoft Windows PE environment.



When this sequence completes the TBMR Recovery Console will be shown.

8.2.1 TBMR Recovery Console Main Menu

When you boot the WinPE DR environment, you will see the TBMR Recovery Console Main Menu as below.

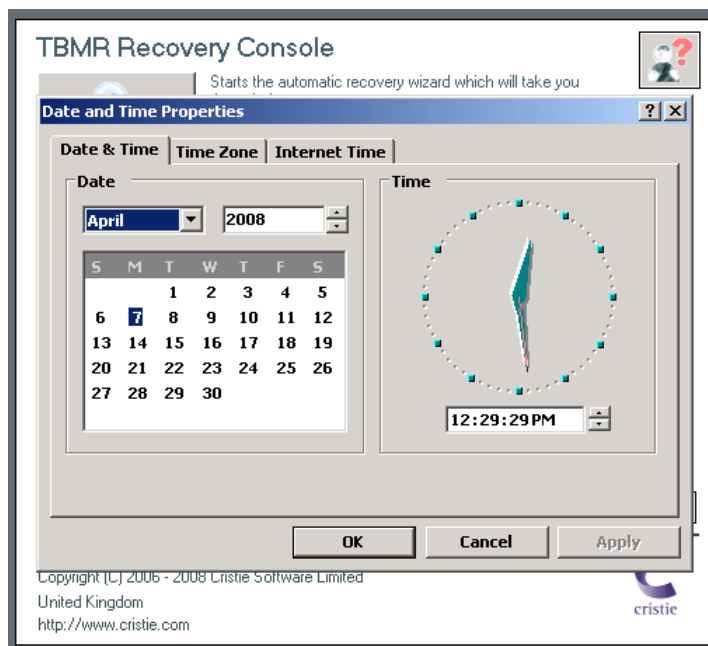


You may configure the displayed date/time and the keyboard layout, by pressing the  icon.

relevant to the recovery.

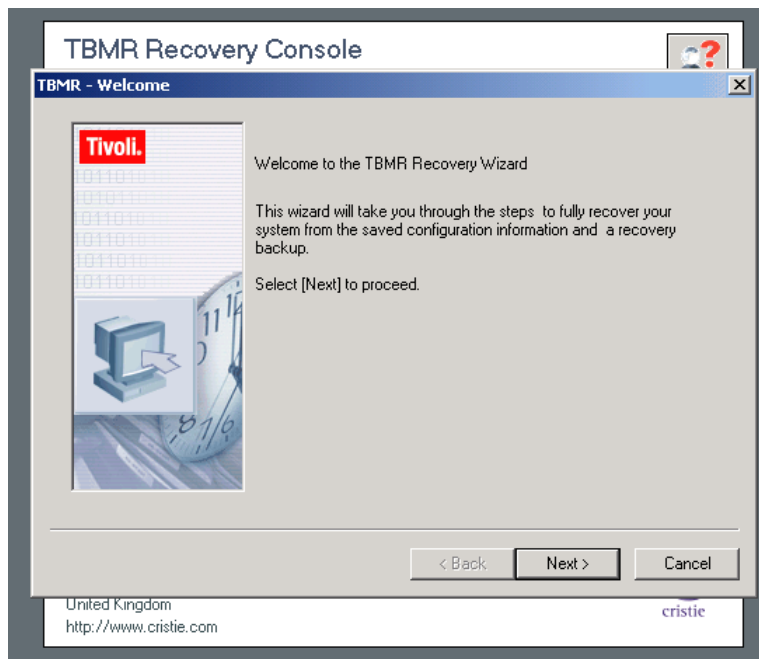


By default the standard display uses US layout, but this may be changed to one of the listed alternatives. Select Date, Time and Time Zone to configure the locale.

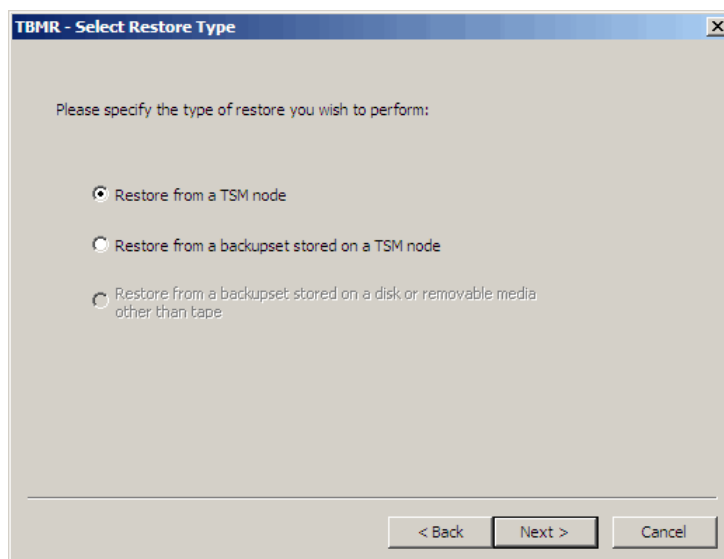


8.2.2 Start Automatic Recovery Wizard

Select this option to commence a automatic DR sequence.



Press **Next>** to proceed to the first step of the sequence. Press **Cancel** to abort the recovery sequence at this point. You will then be presented with a dialog prompting you to select the type of the TSM restore.



At the moment only restoring from a TSM node or an online backupset is supported. A future release will support restoring from a backupset stored on a disk or removable media. Make your choice and press **Next>** to continue.

Restore from Node

If you selected Restore from a node then select **Next>**. This will then display the Enter TSM server details as shown in the next section.

Specify TSM Details and Recovery Date/Time

The first step of the automatic recovery identifies the location of the TSM Server and Node used to back up the Client.

TBMR TSM Details

Please enter the TSM Server and Client details below and select [Next] to continue.

TSM Server Details

Server Address : 10.2.1.20 Port : 1500

Backupset Location :

TSM Client Details

Node Name : NIGELPTBMR

Node Password :

☐ Point-in-time (PIT) restore

Wednesday, June 24, 2009 10:31:16 AM

< Back Next > Cancel

Selecting the Point-in-time (*PIT*) restore mode will allow the system to be recovered to a point closest to the specified date/time. The version of any files restored are closest to but not earlier than the specified date/time. If required to restore from an older date, selecting the down-arrow in the day/month field brings up a calendar.

TBMR Recovery Console

TBMR TSM Details

Please enter the TSM Server and Client details below and select [Next] to continue.

TSM Server Details

Server Address : 10.2.1.20 Port : 1500

Backupset Location :

TSM Client Details

Node Name : NIGELPTBMR

Node Password :

☒ Point-in-time (PIT) restore

Wednesday, June 24, 2009 10:31:16 AM

June, 2009

Sun	Mon	Tue	Wed	Thu	Fri	Sat
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	1	2	3	4
5	6	7	8	9	10	11

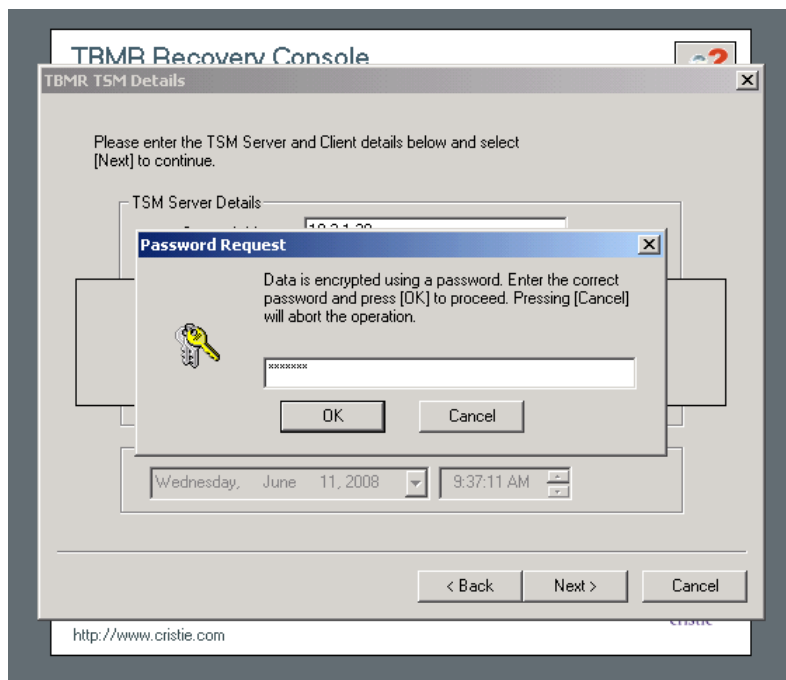
Today: 6/24/2009

< Back Next > Cancel

This can be used to scroll the months/years backwards and forwards as necessary. Note, a future date will result in the latest backup being recovered.

If PIT mode is not selected then, by default, the latest file versions will be restored. Then select **Next>** to continue.

If the backup including the TBMR configuration folder TBMRCFG is encrypted, a prompt for the encryption password will be displayed if not held locally:



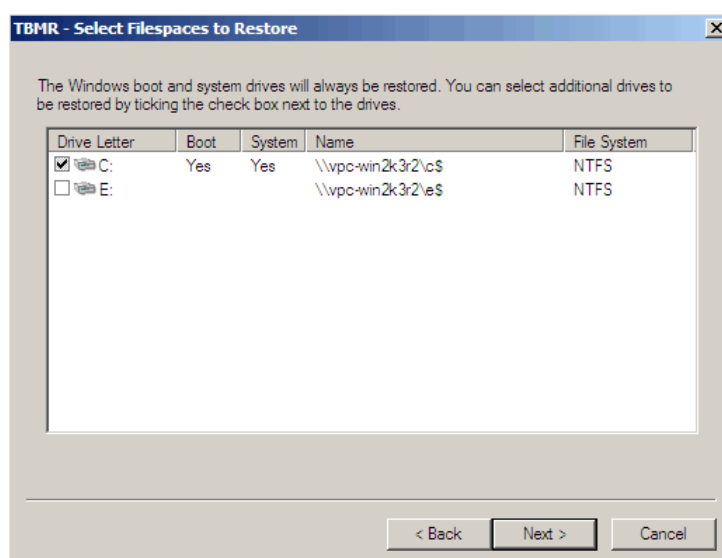
Enter the password used during the backup.

Note: TBMR assumes that TCP/IP is the communication method used between the Client and the Server. Other TSM communication methods are not currently supported.

Press **OK>** to proceed.

Select Filespaces To Restore

The next step prompts for the filespaces to restore. Generally each filespace represents a disk partition or volume. Put a tick against each filespace that should be restored.

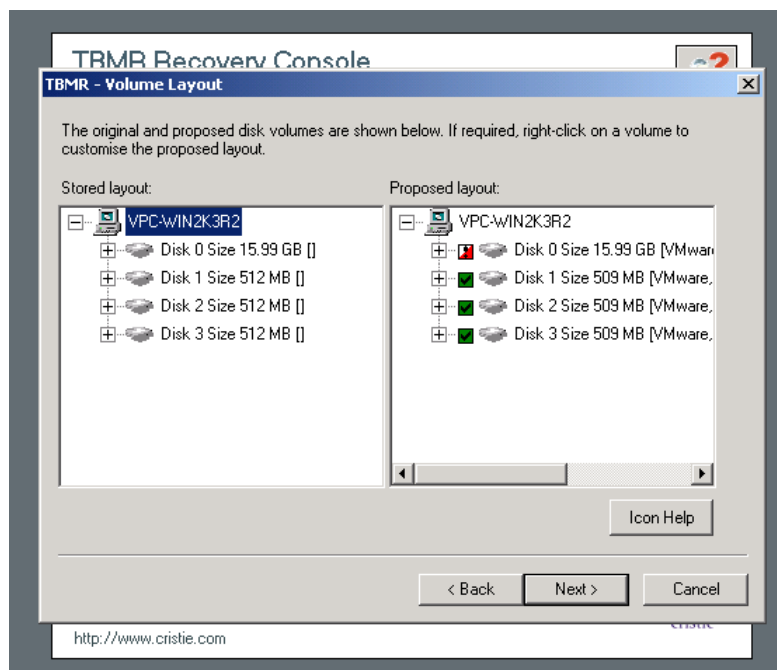


Note that the system and boot partitions (even if on different partitions) will always be restored by default.

Click **Next>** to continue to the next step.

Confirm Volume Layout

The next step in the automatic recovery shows a list of the disks and partitions to be recovered.



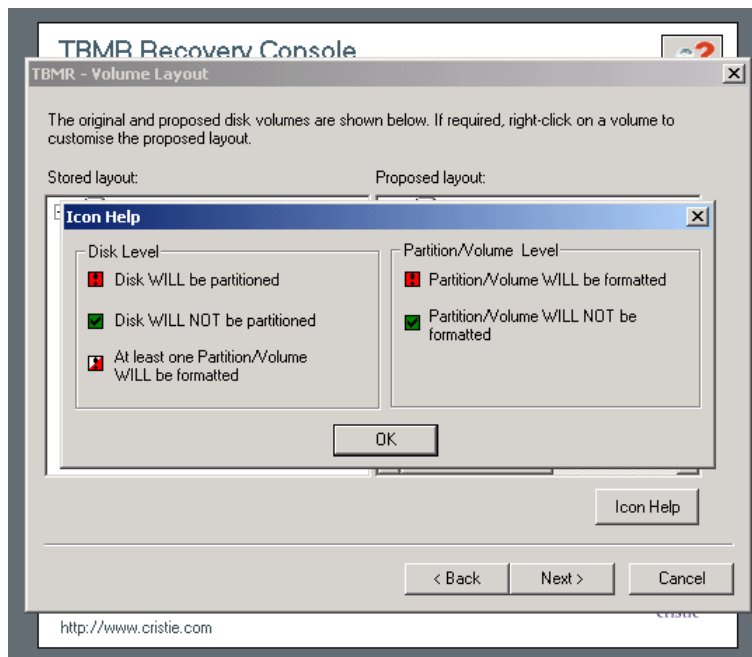
The left-hand panel of the display shows the original disk layout and partitions. The right-hand panel shows how the recovered disks will be partitioned after the recovery.

A green tick box  next to a disk signifies that the disk and its underlying partitions will be left intact. Placed next to a partition/volume means that the corresponding partition/volume WILL NOT be partitioned.

A red exclamation mark  placed next to a disk means it WILL be partitioned during recovery. Placed next to a partition or volume means that the corresponding partition/volume WILL be partitioned.

A red/white exclamation mark  placed next to a disk means at least one partition/volume WILL be partitioned.

Click on the **Icon Help** button to display a summary of this:

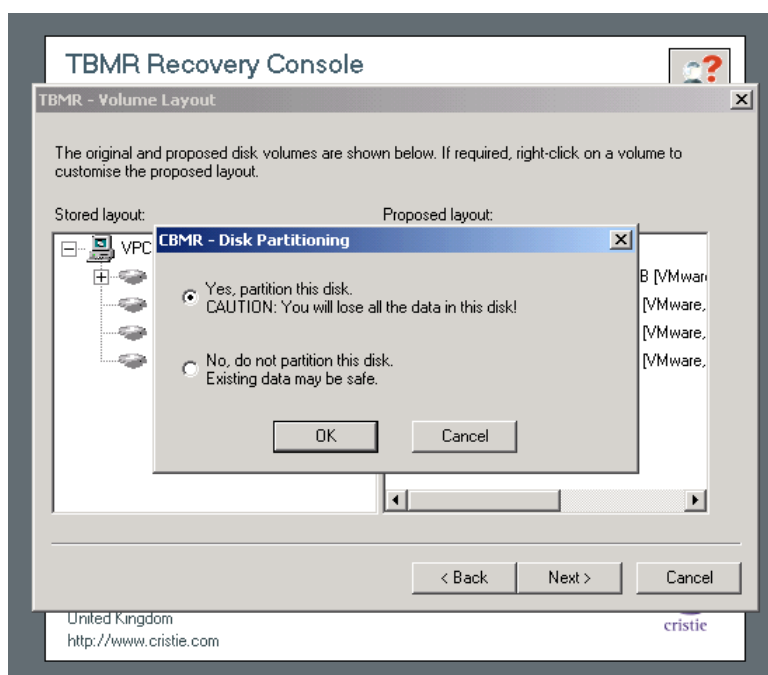


When the recovery is to the original system the contents of both panels will look similar if the number of disks is the same. Possibly the disk sizes will be different (as in the above example).

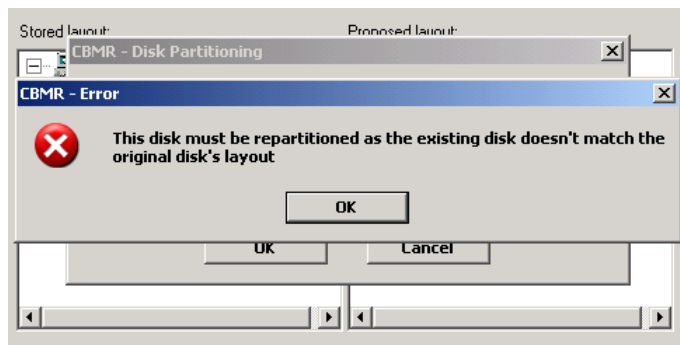
When performing a recovery to a dissimilar system the disk mapping can be much more complex. Some of the criteria used to judge the disk mapping match are:

- disk geometry (tracks, cylinders and sectors)
- disk capacity
- if currently formatted, the disk signature

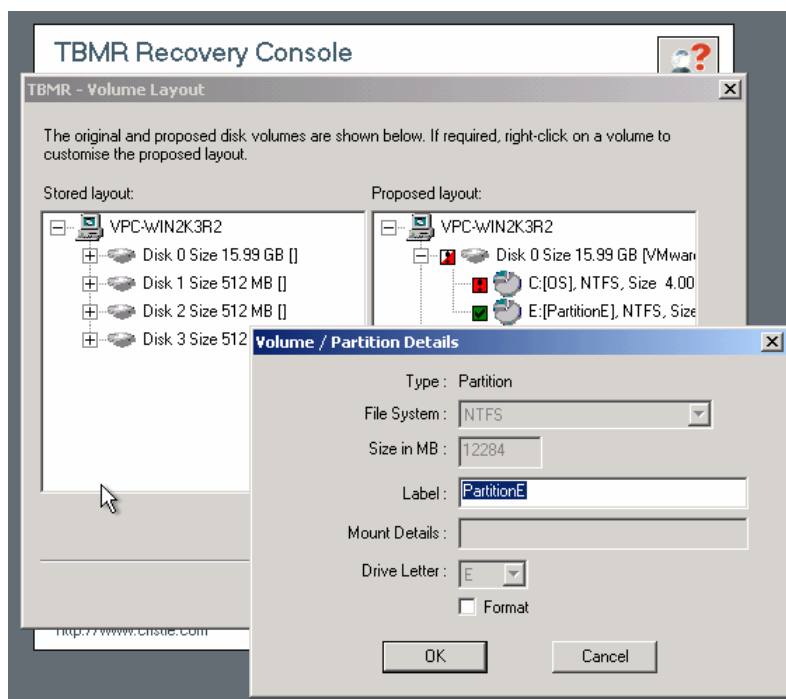
You may right-click on any disk shown in the right-hand panel to select whether the disk will be formatted or not.



Any attempt to turn off formatting incorrectly will result in this error.



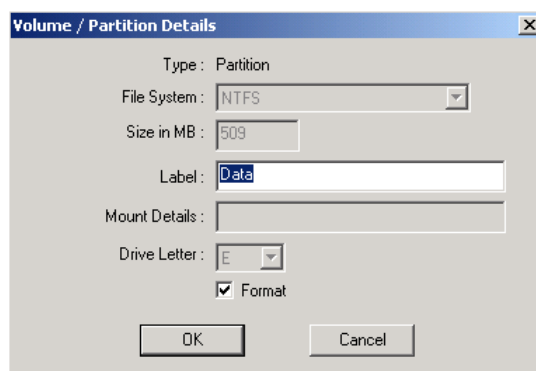
You may also right-click on a partition to allow you to selectively modify the partition parameters or to remove it altogether.



You may Modify the following partition parameters:

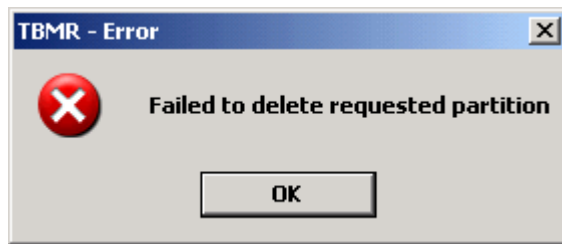
- size in MB (only if disk is shown with a )
- label
- format (yes/no)

The screenshot below shows this.



Select **Delete** to remove the partition completely (only if disk is shown with a ).

If you attempt to either not format or delete a Windows system partition, an error such as this will be displayed.



At this stage nothing has happened to the disks. Press **Next>** to continue with the recovery.

Proceed With The Recovery

Before continuing with the actual recovery a final warning screen is displayed.

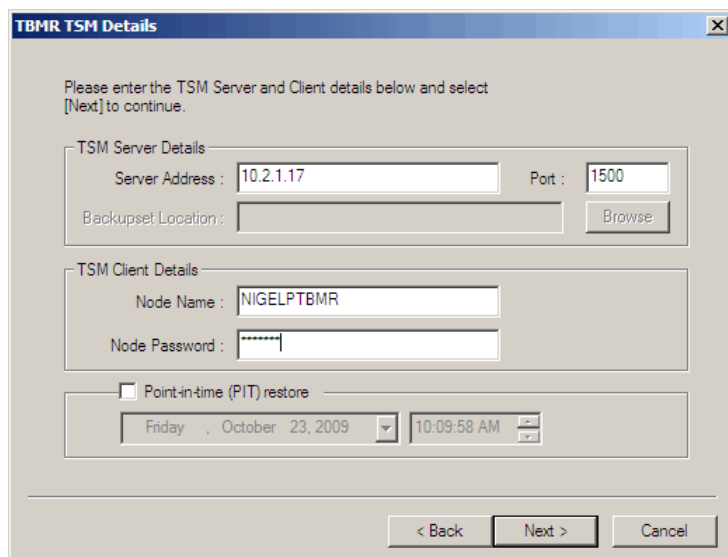


If you are happy with the recovery configuration, press **Finish**. This will commence the actual recovery.

Note: This procedure will completely destroy any existing data on disks selected for format (i.e shown with a ). Disks or partitions tagged as *no format* (i.e. shown with a ) will however be retained.

Restore from Backupset

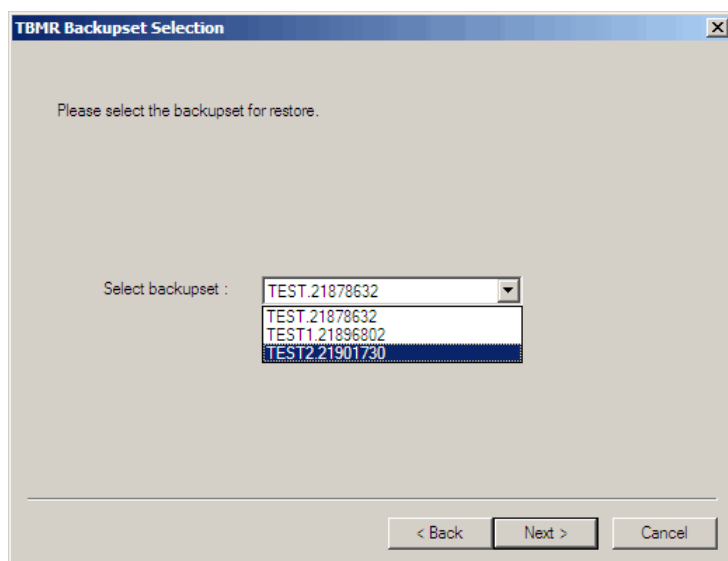
If you selected Restore from a backupset then select **Next>**. This will then display the Enter TSM server details:



The TBMR TSM Details dialog box is used for entering TSM Server and Client details. It contains the following fields and controls:

- TSM Server Details:**
 - Server Address: 10.2.1.17
 - Port: 1500
 - Backupset Location: (empty field with a Browse button)
- TSM Client Details:**
 - Node Name: NIGELPTBMR
 - Node Password: (masked with asterisks)
- Point-in-time (PIT) restore:**
 - Checkbox: ☐ Point-in-time (PIT) restore
 - Calendar: Friday, October 23, 2009
 - Time: 10:09:58 AM
- Navigation:** < Back, Next >, Cancel

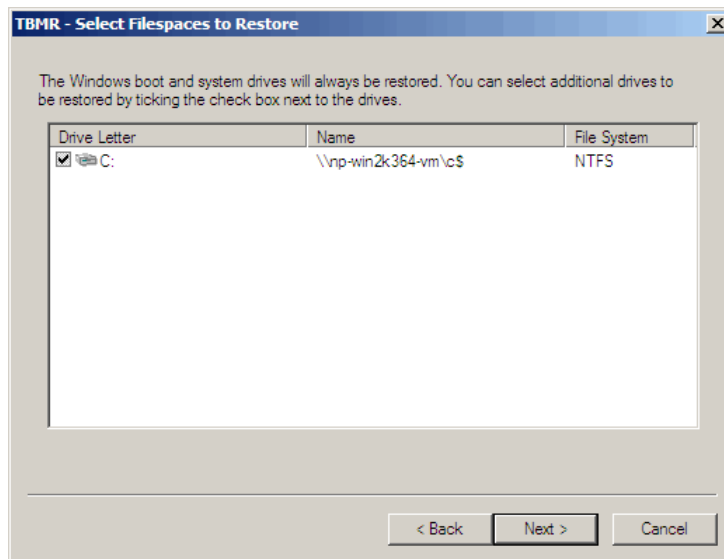
The system configuration will then be restored from the appropriate backupset which is selected from the next dialog:



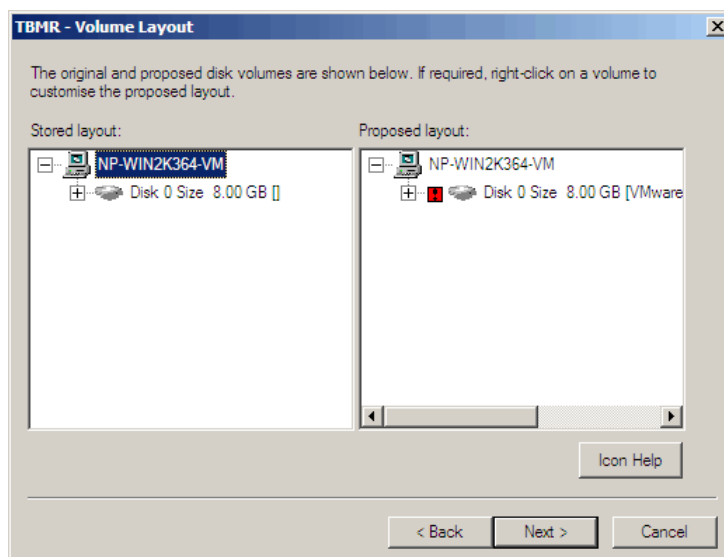
The TBMR Backupset Selection dialog box is used for selecting a backupset for restore. It contains the following fields and controls:

- Select backupset:** A dropdown menu showing the selected backupset: TEST.21878632. The list of available backupsets is:
 - TEST.21878632
 - TEST1.21896802
 - TEST2.21901730
- Navigation:** < Back, Next >, Cancel

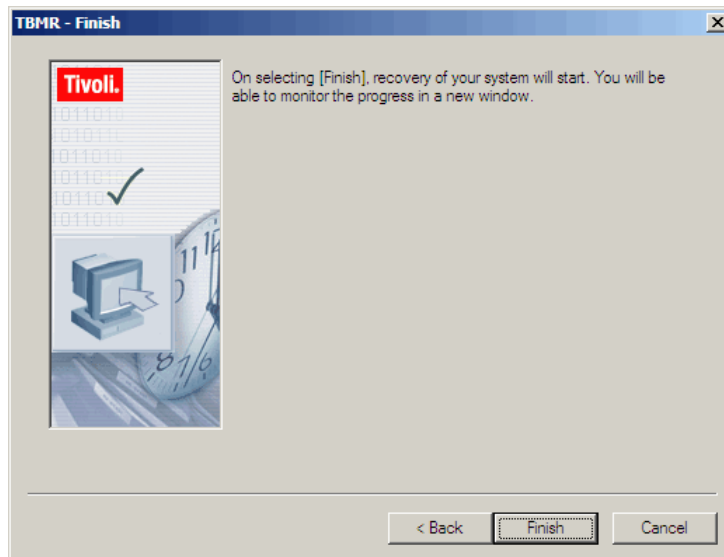
The configuration will then be retrieved from the selected backupset. The DR process continues from the **Select Filespaces to Restore** dialog.



Select the filespace to restore and then the partition layout for the recovering system:



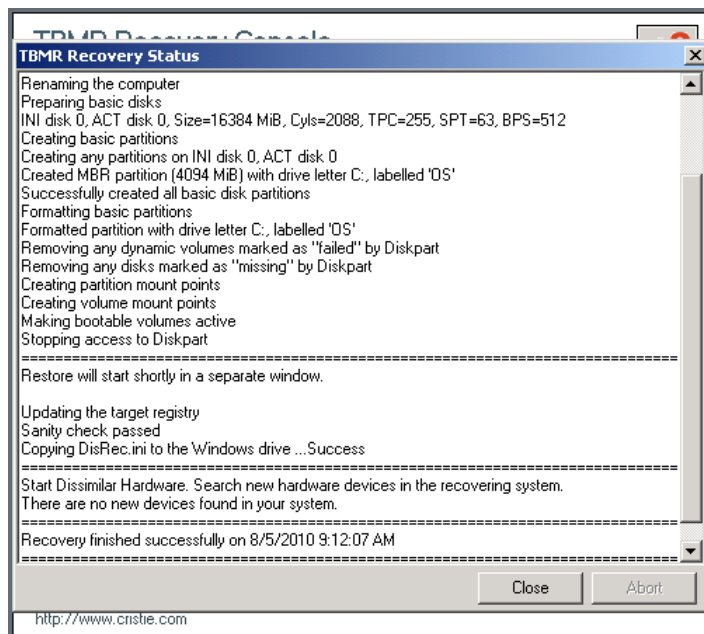
Finally select **Finish** and the recovery will then proceed.



The subsequent recovery continues as described in section Disk Recovery Sequence.

Disk Recovery Sequence

The recovery sequence begins by preparing the disks selected for the recovery.

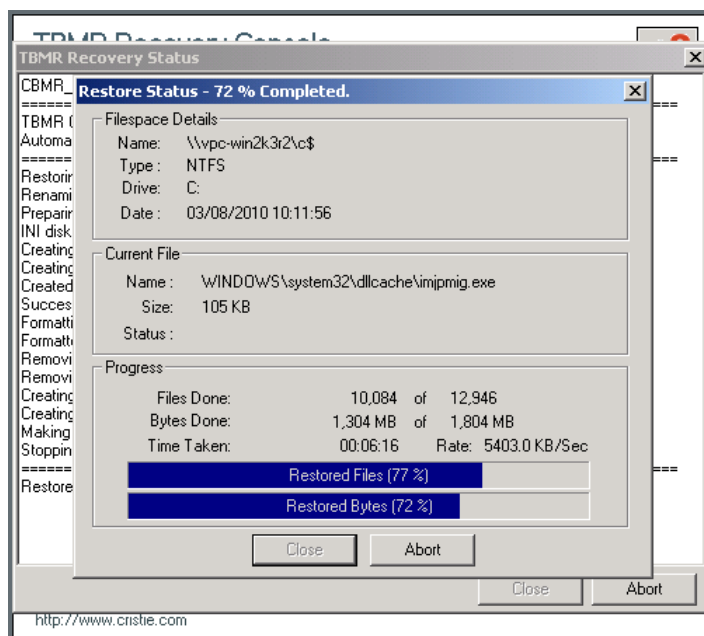


This involves:

- disk mapping original layout to new
- cleaning (removing any existing disk partitions)
- removing any existing dynamic volume databases
- re-creating the partitions
- converting to dynamic volumes if required
- formatting to the required partition type
- create partition/volume mount points
- makes bootable volumes active

The next step is to recover the filesystems to the selected target disks/partitions. A new window appears containing the restore status of recovered files and progress bars indicating how much of the backup has been restored. This display also shows the recovery statistics in terms of time, size and throughput.

Note that the recovery is divided into different phases: SystemState followed by the recovery of each volume filesystem selected.



This process may take some minutes if the backups are large. You may select the **Abort** button to terminate the file recovery process, but this may leave the disk or partition in an unpredictable state which may be unusable.

If any errors occur during the recovery, an error message will be shown in the window. Refer to the logs post recovery to establish the cause of any error.

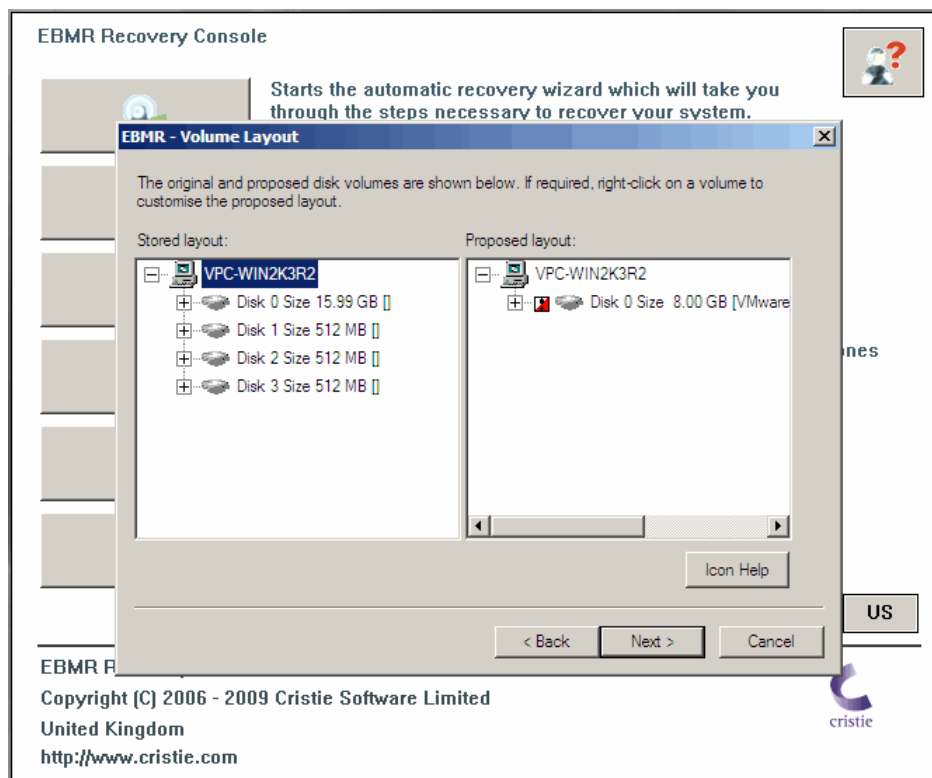
The final steps of the recovery are to:

- run a sanity check to determine if all the expected boot files are present on the boot volume
- run a dissimilar hardware check to determine if new drivers are required for new boot devices

Finally press **Close** to return to the Recovery Console main menu. At this point you may want to view the recovery logs and perhaps copy the logs to a local device or remote share before selecting to reboot. Note that recovery logs are also saved to the recovered system to the TBMR installation sub-folder 'Temp' (e.g. "C:\Program Files\Cristie\TBMR\Temp").

Disk Scaling

In situations where the target system has fewer or smaller disks than the original system, disk scaling will come into effect. For example,



The above example shows a recovery from an original system with 4 physical disks to a target system with only 1 disk. The target disk is also much smaller than the original disks.

In this case TBMR will select as many disks to recover as possible (in this case only 1 disk - the boot disk). In addition it will scale the partitions down in proportion to their original size and occupancy. This can be complicated by having say mirrored dynamic volumes when the mirror will need to be broken - if only 1 disk exists on the target (or it has been tagged as not to modify).

Note 1: The Volume Layout dialog will only show disks in the left hand panel that can be recovered.

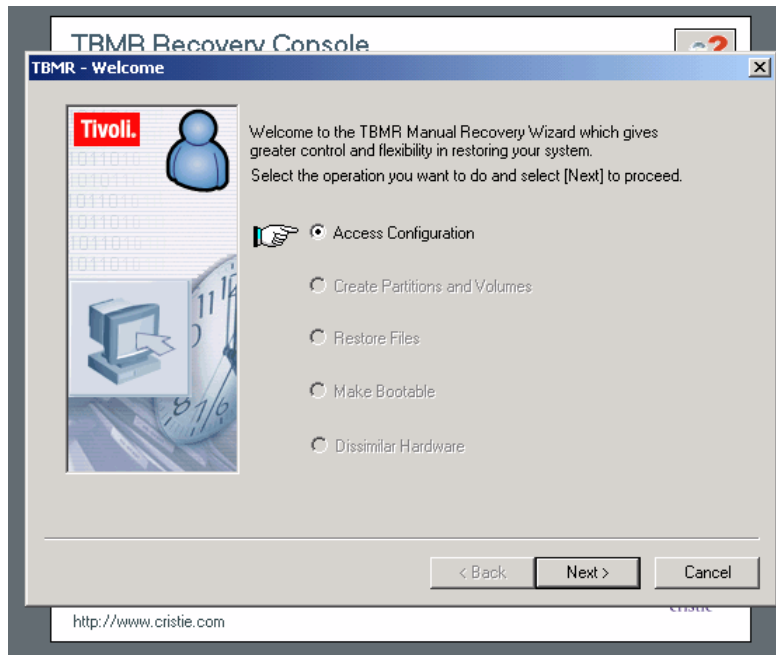
Note 2: During a recovery to a system with larger disks the partition sizes will remain the same as the original by default. However, in this case, it is possible to increase partition size manually during the recovery by right-clicking on the partition icon and selecting Modify.

8.2.3 Start Manual Recovery Sequence

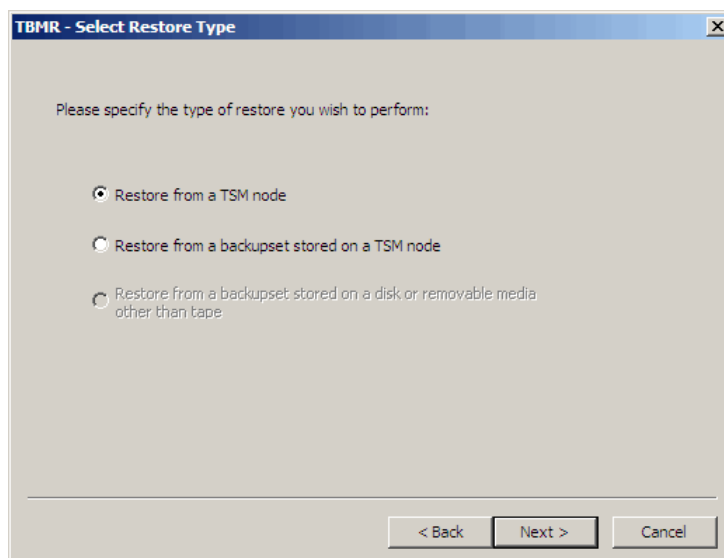
Select this option to commence a manual DR sequence. This option will stop after each step in the DR sequence allowing the DR to be aborted or the step to be repeated with different parameters.

Locate Configuration

The first step of the manual DR sequence is to provide the location of the DR configuration.

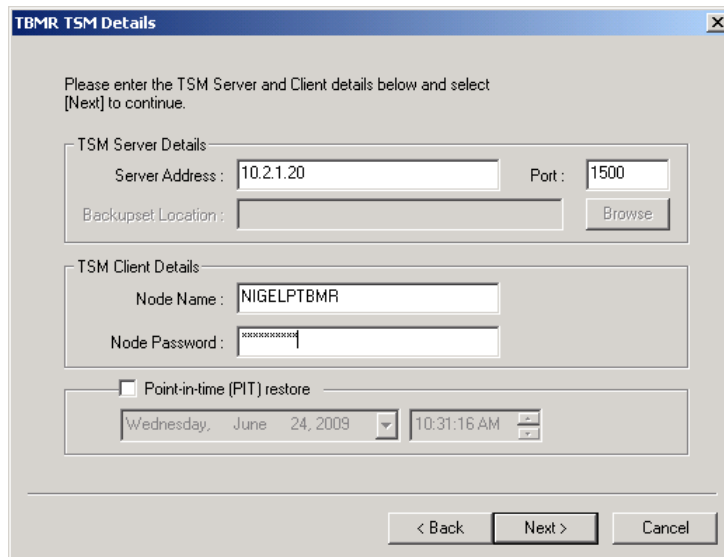


Press **Next>** to proceed to the first step of the sequence. Press **Cancel** to abort the recovery sequence at this point. You will then be presented with a dialog prompting you to select the type of the TSM restore.



At the moment only restoring from a TSM node or an online backupset is supported. A future release will support restoring from a backupset stored on a disk or removable media.

Press **Next>** to continue to:



TBMR TSM Details

Please enter the TSM Server and Client details below and select [Next] to continue.

TSM Server Details

Server Address : 10.2.1.20 Port : 1500

Backupset Location :

TSM Client Details

Node Name : NIGELPTBMR

Node Password :

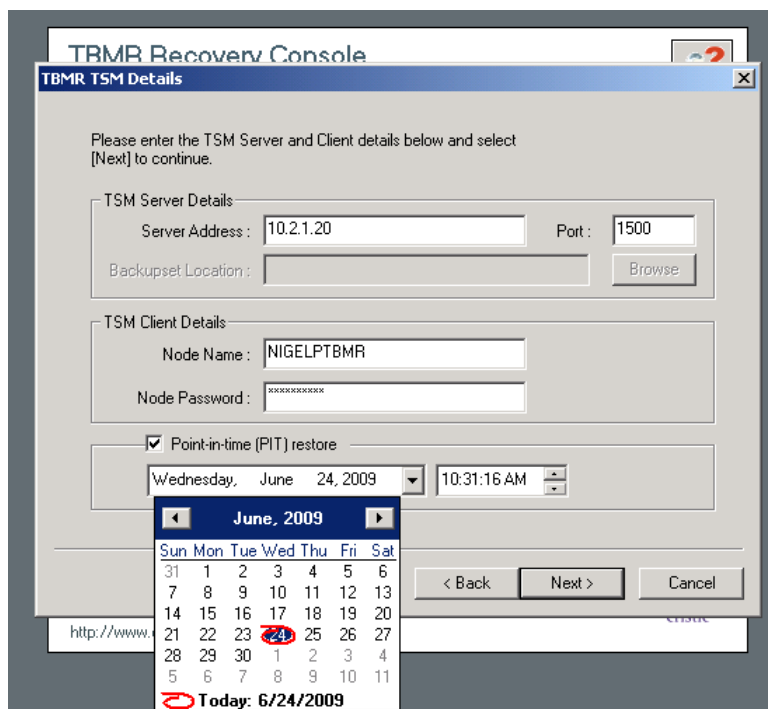
☐ Point-in-time (PIT) restore

Wednesday, June 24, 2009 10:31:16 AM

< Back Next > Cancel

Specify the location of the TSM Server and Node used to back up the Client.

Selecting the Point-in-time (PIT) restore mode will allow the system to be recovered to a point closest to the specified date/time. The version of any files restored are closest to but not younger than the specified date/time. If required date is not the current WinPE date, selecting the down-arrow in the day/month field brings up a calendar.



TBMR Recovery Console

TBMR TSM Details

Please enter the TSM Server and Client details below and select [Next] to continue.

TSM Server Details

Server Address : 10.2.1.20 Port : 1500

Backupset Location :

TSM Client Details

Node Name : NIGELPTBMR

Node Password :

☒ Point-in-time (PIT) restore

Wednesday, June 24, 2009 10:31:16 AM

June, 2009

Sun	Mon	Tue	Wed	Thu	Fri	Sat
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	1	2	3	4
5	6	7	8	9	10	11

Today: 6/24/2009

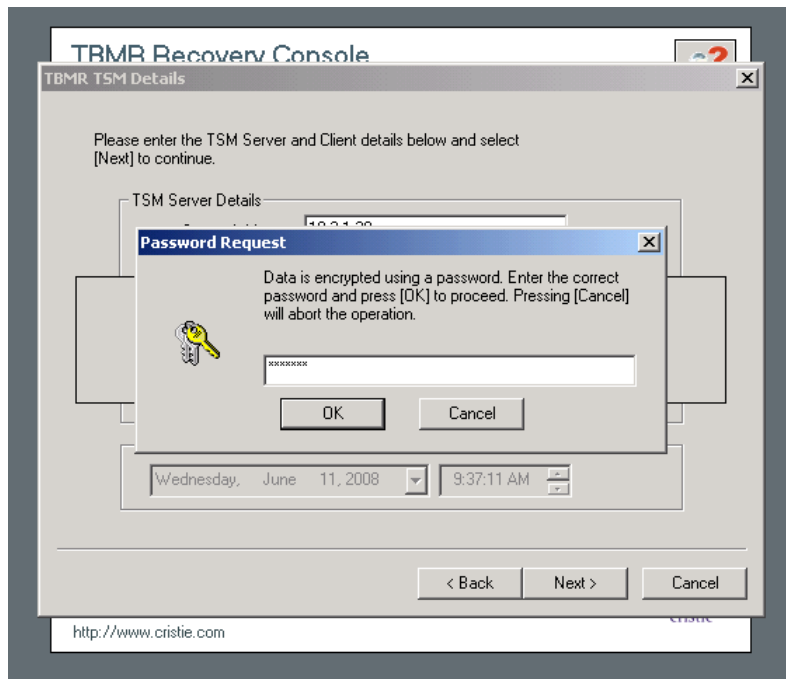
< Back Next > Cancel

This can be used to scroll the months/years backwards and forwards as necessary. Note, a future date will result in the latest backup being recovered.

The next dialog displayed depends upon whether you selected restore from node or restore from backupset.

8.3 Restore from Node

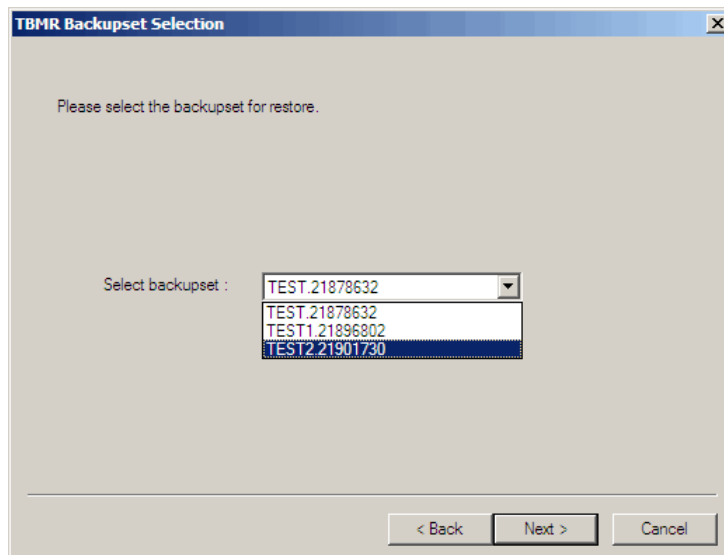
Then select **Next>** to continue. If the backup including the TBMR configuration folder TBMRCFG is encrypted, a prompt for the encryption password will be displayed if not held locally:



Enter the password used during the backup and press **OK>**.

8.4 Restore from Backupset

The system configuration will be restored from the appropriate backupset which is selected from the next dialog:



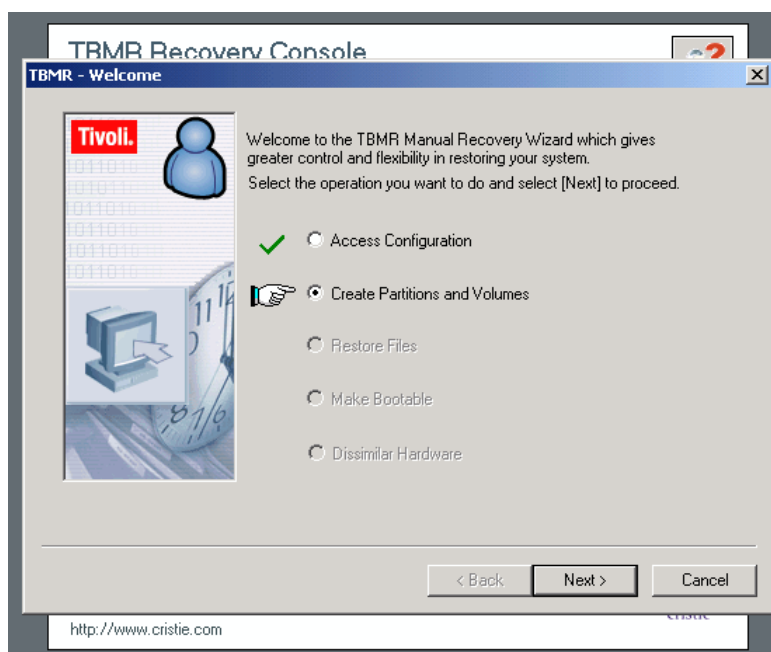
Successful extraction of the configuration from the server is confirmed with the following dialog:



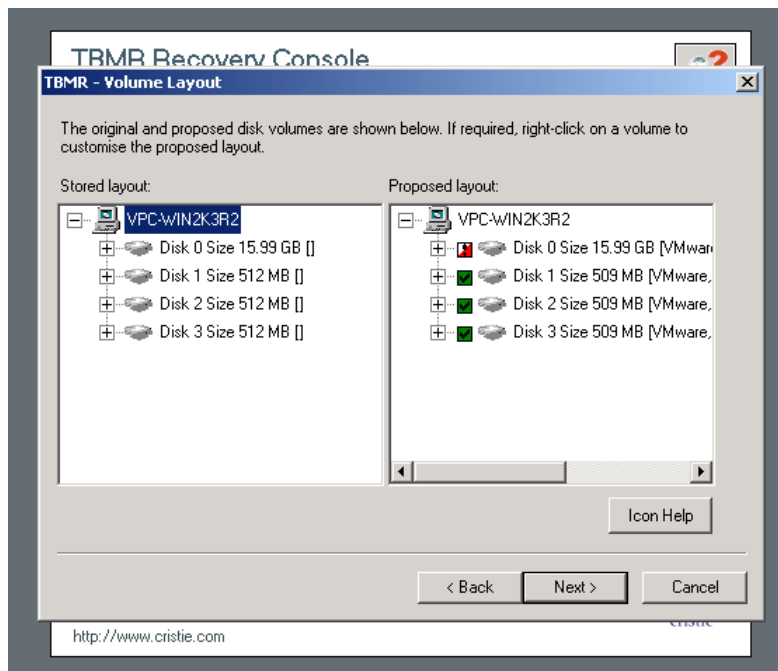
Select **Finish** and control returns to the next step in the Manual Recovery sequence.

Create Partition and Volumes

The next step of the manual recovery process is to configure the target disk partitions and volumes.



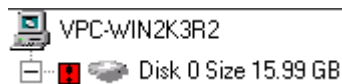
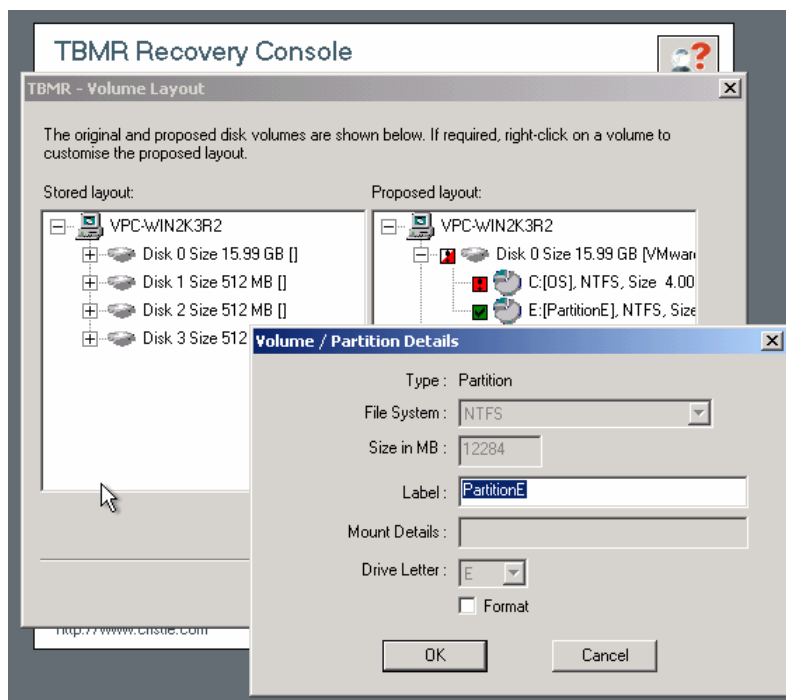
Select **Next>** to display the Volume Layout dialog.



This screen shows the original disk layout against that of the target system. Naturally the target disk layout could be very different to the original. TBMR will attempt to match the disks using its own in-built criteria. Some of the criteria used to judge the match are:

- disk geometry (tracks, cylinders and sectors)
- disk capacity
- if currently formatted, the disk signature

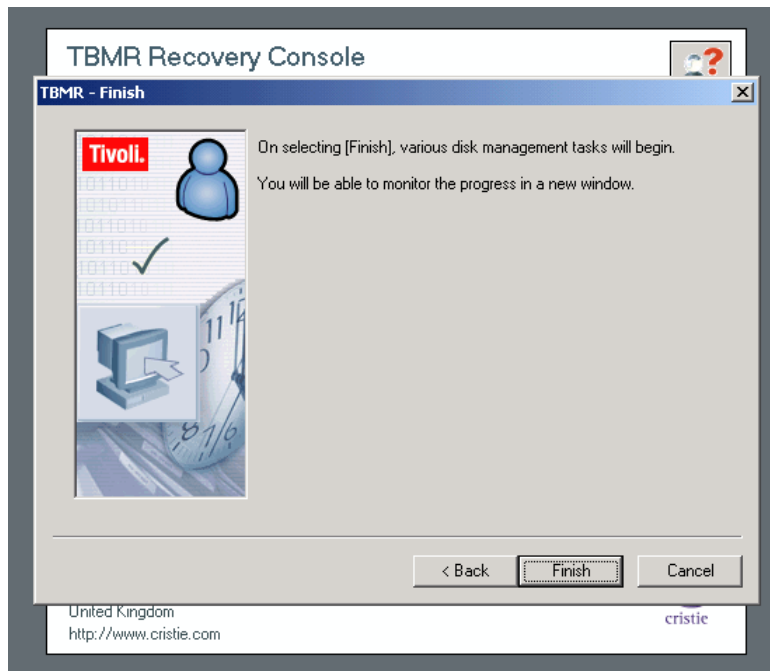
However, it is possible to change the partition size or opt to tag/untag whether or not a partition should be formatted. To do this right click on the the disk icon and the following configuration dialog is displayed.



The indicator shown next to the disk icon indicates whether that disk will be left intact or not. A red exclamation mark indicates that the disk will be re-partitioned and/or formatted. A green tick indicates that the disk will be left intact.

Disks and partitions are discussed in more detail in the Automatic Recovery - Recovery Details section.

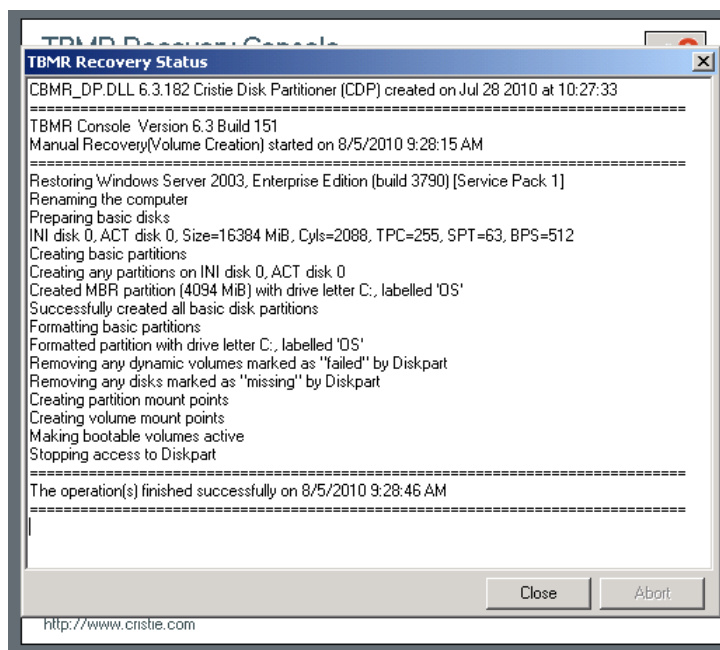
Press **<Back** to return to the previous step, **Finish** to commence the active part of this step or **Cancel** to abort.



If you are happy with the recovery configuration, press **Finish**. This will commence the actual recovery.

Note: This procedure will completely destroy any existing data on the disks selected for recovery. Disks or partitions tagged as *no format* will however be retained.

The Create Partitions and Volumes step begins by preparing the disk selected for the recovery.



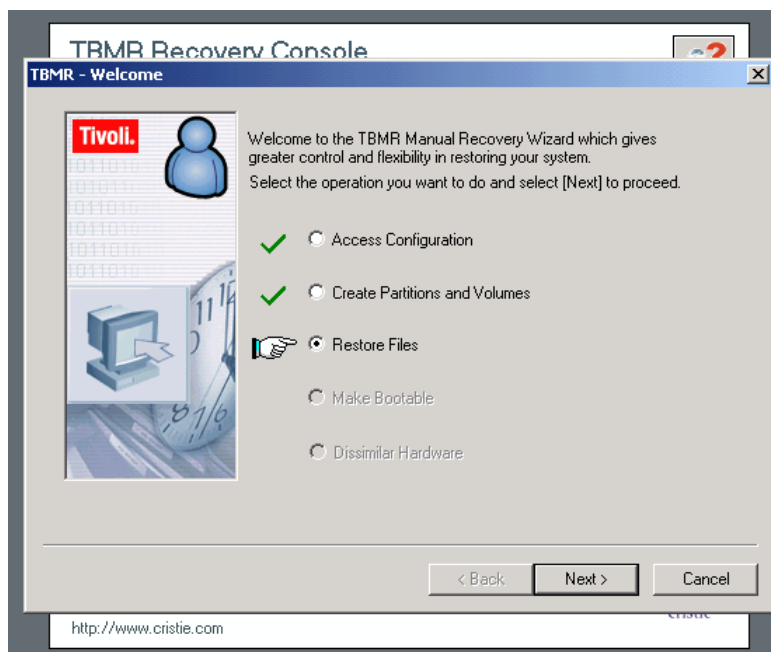
This involves:

- disk mapping original layout to new
- cleaning (removing any existing disk partitions)
- removing any existing dynamic volume databases
- re-creating the partitions
- converting to dynamic volumes if required
- formatting to the required partition type
- create partition/volume mount points
- makes bootable volumes active

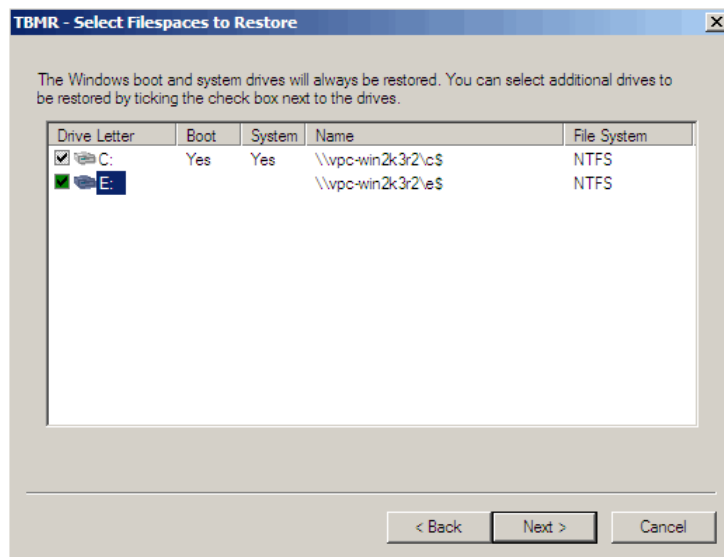
Press **Close>** to continue with the recovery.

Restore Files

The next step of the manual recovery process is to restore the DR backup files.



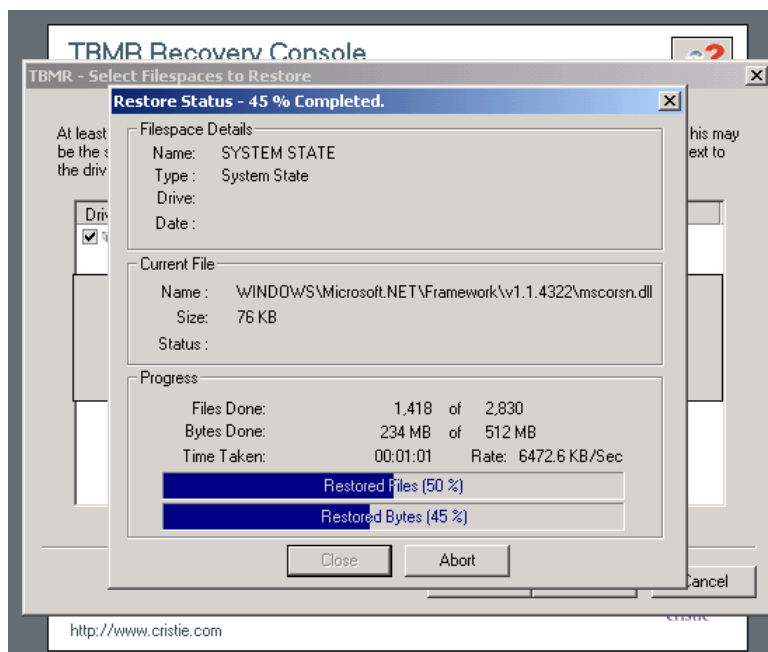
Press **Next>** to identify the TSM filespace that should be recovered. Note that the *SystemState* filespace will always be recovered by default.



Press **Next>** to commence the restore of the TSM filespace to their target disks/partitions.

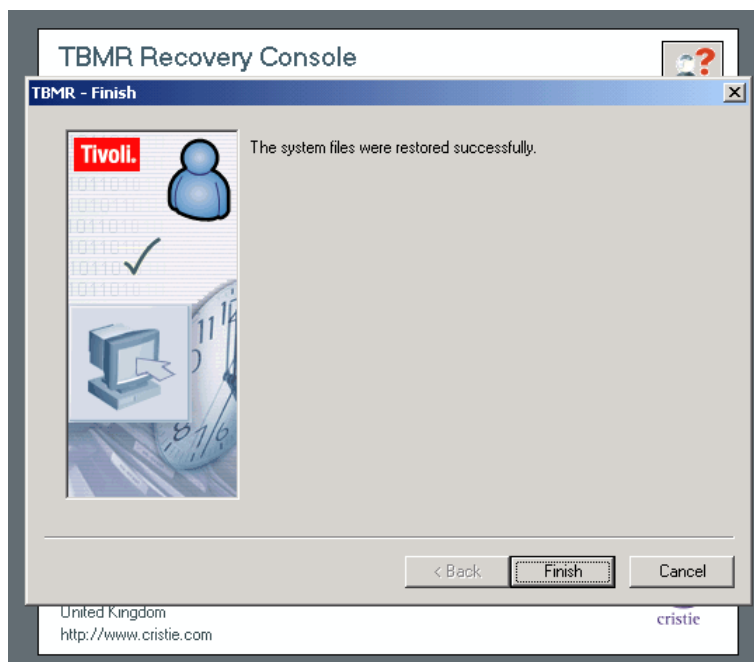
Finally, a new window appears containing the restore status of recovered files and progress bars indicating how much of the backup has been restored. This display also shows the recovery statistics in terms of time, size and throughput.

Note that the recovery is divided into different phases: SystemState followed by the recovery of each volume filespace selected.



This process may take some minutes if the backups are large. You may select the **Abort** button to terminate the file recovery process, but this may leave the disk or partition in an unpredictable state which may be unusable.

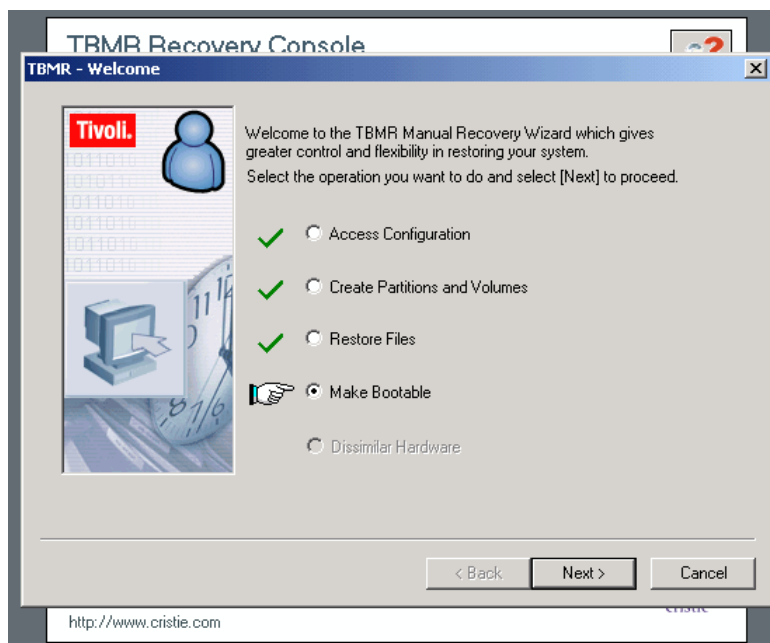
If any errors occur during the recovery, an error message will be shown in the window. Refer to the logs post recovery to establish the cause of any error. When the restore files step completes the following dialog is displayed.



Select **Finish** and control returns to the next step in the Manual Recovery sequence.

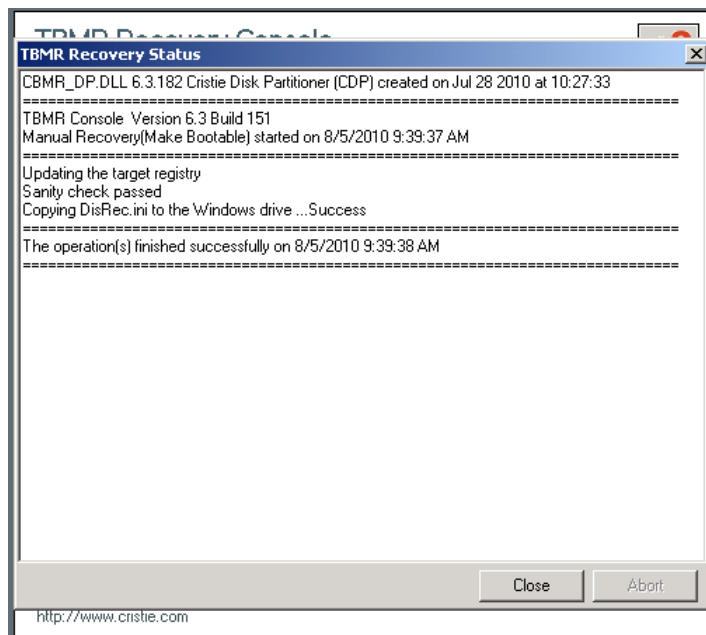
Make Bootable

The next step in the manual recovery sequence is to make the original disk 'bootable'. This involves re-creating the MBR of the boot disk and modifying the registry with the new disk GUID.



Press **Next>** to commence the make bootable step..

A new dialog window opens summarising the success or failure of the operation..



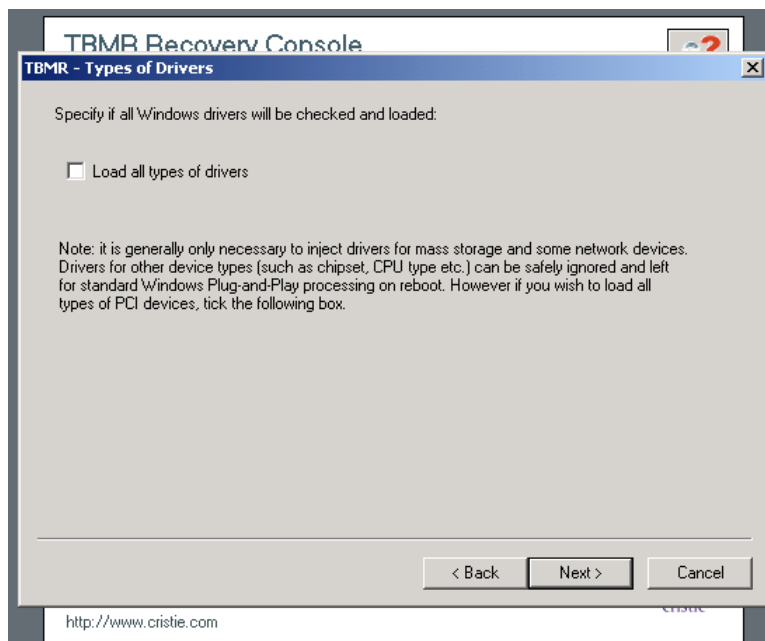
Press **Close** to complete the step and return to the Manual Recovery Wizard.

Dissimilar Hardware

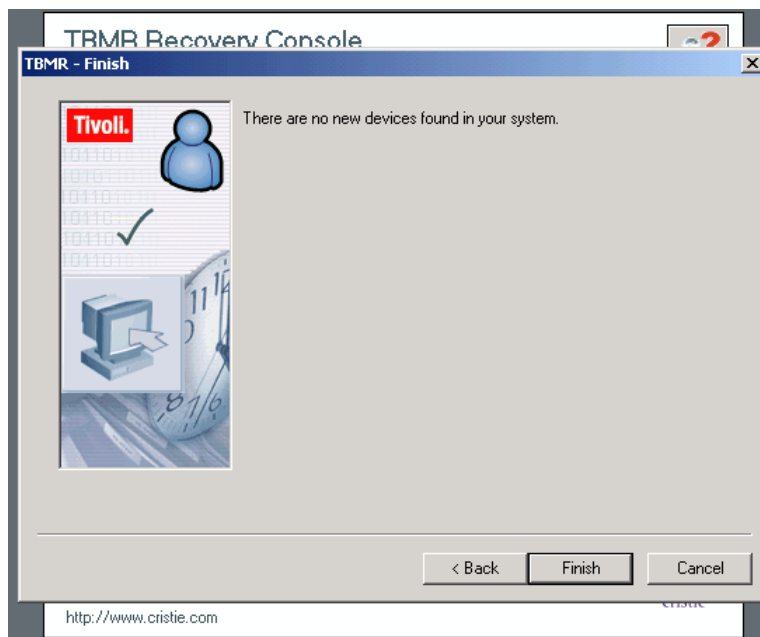
The final step in the manual DR sequence is to check if the recovery is to dissimilar hardware.

This is determined by comparing the drivers currently in use by Windows PE and the drivers listed in the recovered machine's registry.

The step first prompts for what driver types should be checked. By default only Mass Storage (disk) and network devices are checked.



Press **Next>** to continue. For recovery to similar hardware no new devices will be found and this will be confirmed by this dialog:



Press **Finish** to complete the manual recovery sequence.

8.4.1 Tools

There are a few tools that can assist with the recovery process. They are all collected under this command button.



The options available are:

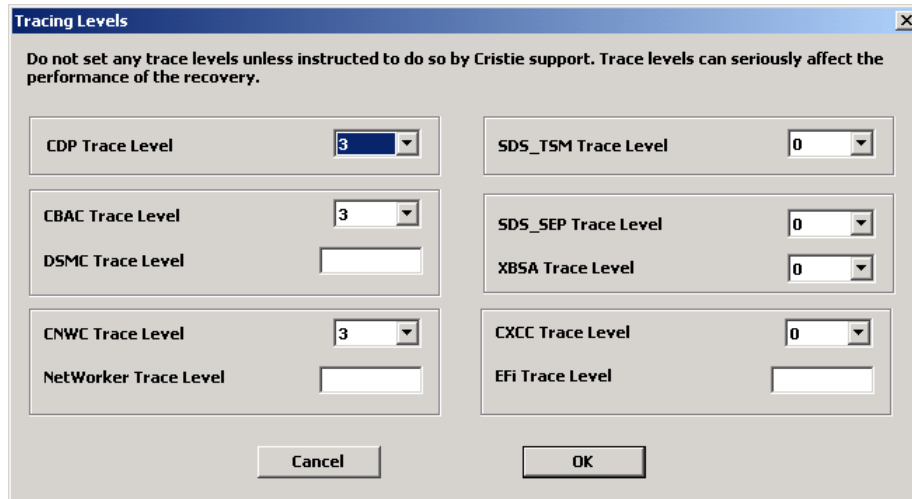
- Configure the network
- Dissimilar Hardware Wizard
- Start VNC
- Set trace levels
- Advanced options

Selecting **Configure the network** will start the Cristie Network Configurator tool. This provides extensive facilities to configure network during the DR process.

The **Dissimilar Hardware Wizard** will allow drivers to be injected into the recovered system when the target hardware has different devices from the original (e.g. RAID controllers). Normally this will be done automatically as part of the DR sequence and will not need to be run manually.

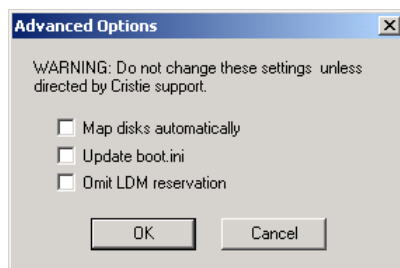
Start VNC will run a VNC server within the PE environment so allowing external VNC clients to remotely connect during the DR session. The start process will provide you with the current IP address of the PE environment which you will need to specify in the VNC client. Note that the VNC connection is also password protected. The VNC feature is intended for diagnosing DR problems under the guidance of Cristie Support who will provide the password upon request.

Set trace levels allows the DR log file trace to be increased or decreased as required.



It is recommended that the trace levels are only changed when advised to do so by Cristie Support staff. This is because they could have a severe impact upon the performance of the backup restore process.

Advanced options should only be selected when advised to do so by Cristie Support staff.



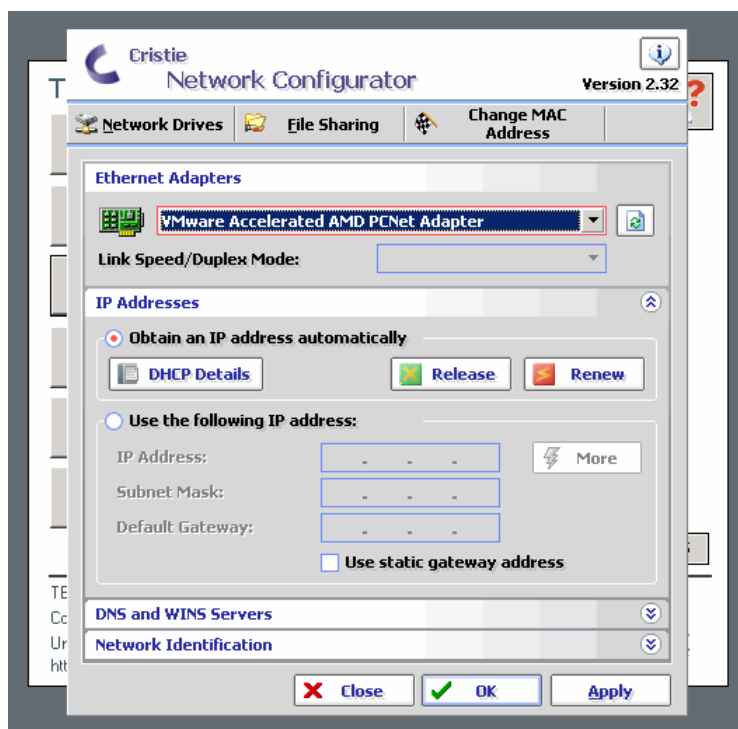
Cristie Network Configurator Tool

This is a very powerful tool that provides extensive facilities to configure the network during the recovery process. It offers the following features:

- supports multiple NICs
- configure individual NIC parameters for duplex mode and link speed
- the ability to select DHCP allocated or static IP addresses
- the ability to setup DNS and WINS server IP addresses
- the ability to setup the Network Identification of the recovering system.
- allow file shares to be set on the recovering system.
- map/unmap network drives.

Configure NIC Parameters

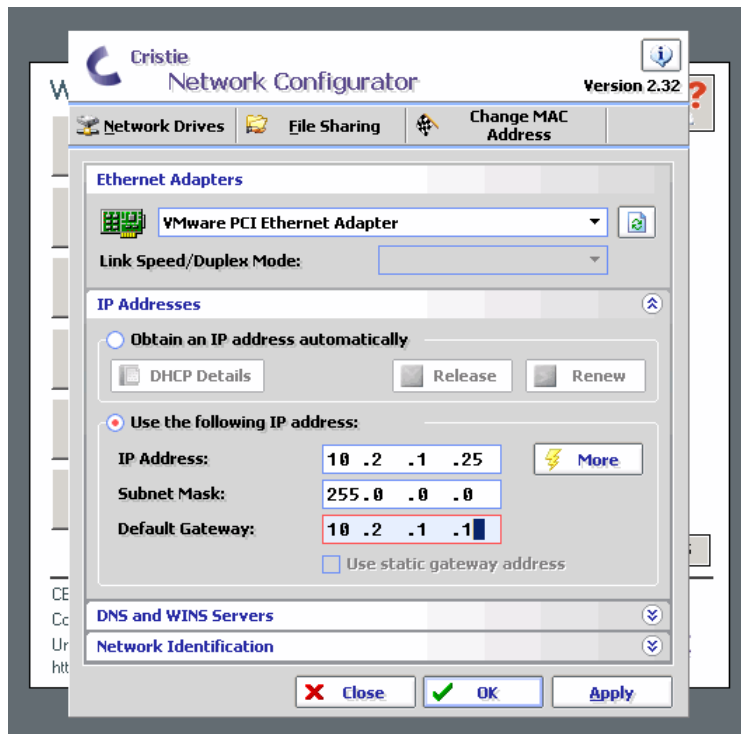
It is possible to change both the link speed and duplex mode for any NIC detected on the recovering target system. Simply choose the NIC from the drop down box and select the desired mode. *Autosense* is the default.



Assign Static or DHCP IP Settings

Normally the WinPE DR environment will start with DHCP enabled and active. However, if a static IP is required use the Use the following IP Addresses option to manually configure.

First choose the network adapter from the drop down list where a static IP address is to be applied.



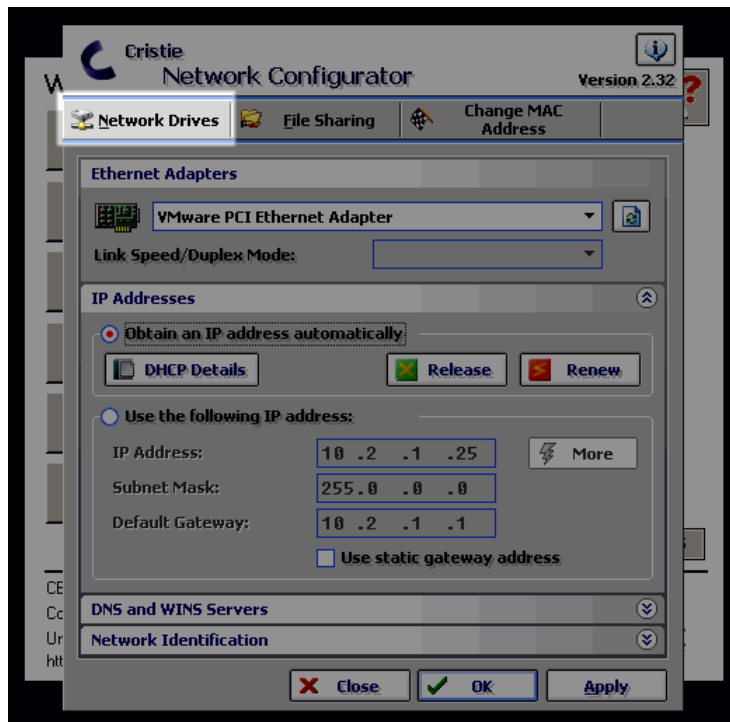
Select Use the following IP Addresses radio button and set the IP address, subnet mask and gateway IP address. The **More** button will allow the system to have more than one static IP addresses.

Click on **Apply** to confirm the settings for the selected adapter.

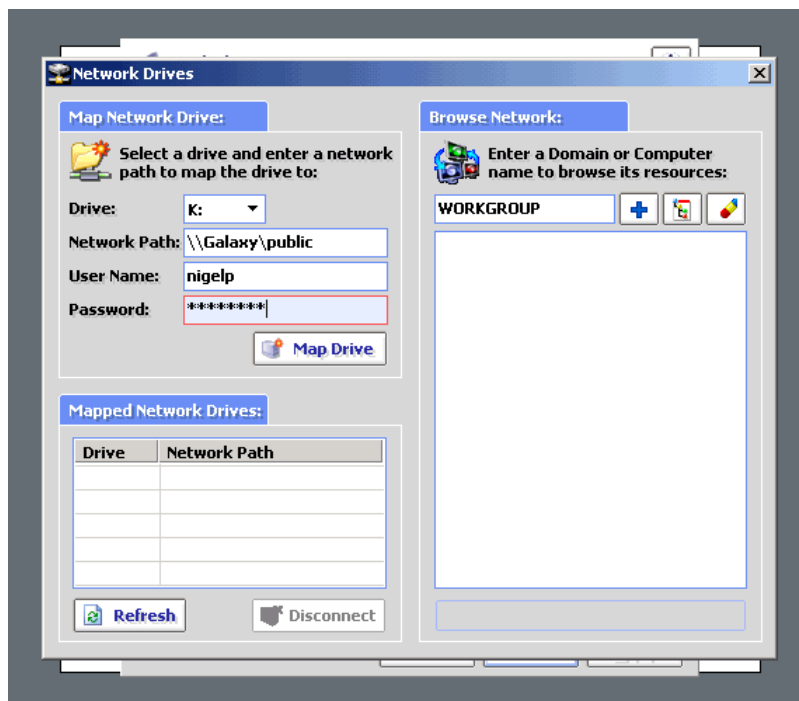
This feature will also allow the DHCP lease to be released or renewed, as required.

Map a Network Drive

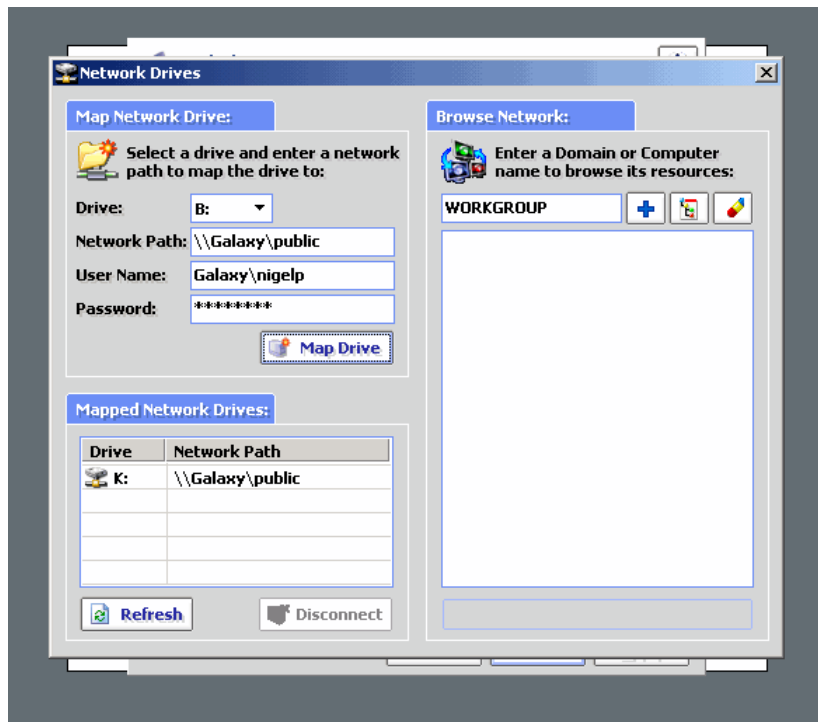
In order to simplify access to network resources, the Network Configurator allows you to map a network drive to a network share.



Start the Network Configurator from the Tools menu and select the **Network Drives** button.



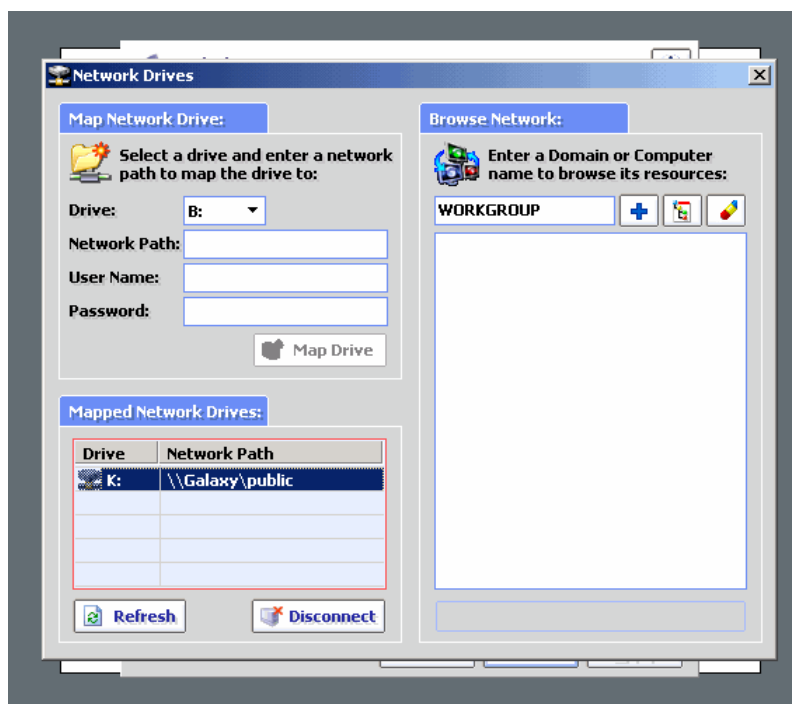
Select the drive letter that you wish to allocate from the Drive drop-down box and type in the share name that you wish to associate with it. Also specify the network credentials to be used to access the share. Press **Map Drive** to confirm the share operation. If successful the share will be added to the Mapped Network Drives table (see below).



Press the  icon on the top right of the dialog window to return to the Network Configurator main menu.

Disconnect Network Drives

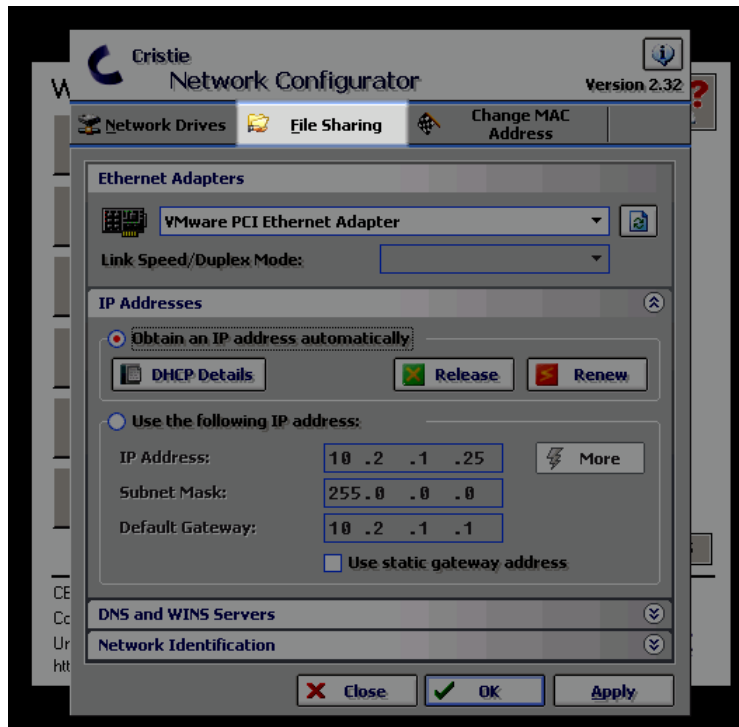
If you need to disconnect a mapped drive for any reason, this option allows you to do this.



Just highlight the drive that you wish to disconnect from the **Mapped Network Drives** list and then click **Disconnect**. The mapped drive is removed from the list to confirm the operation.

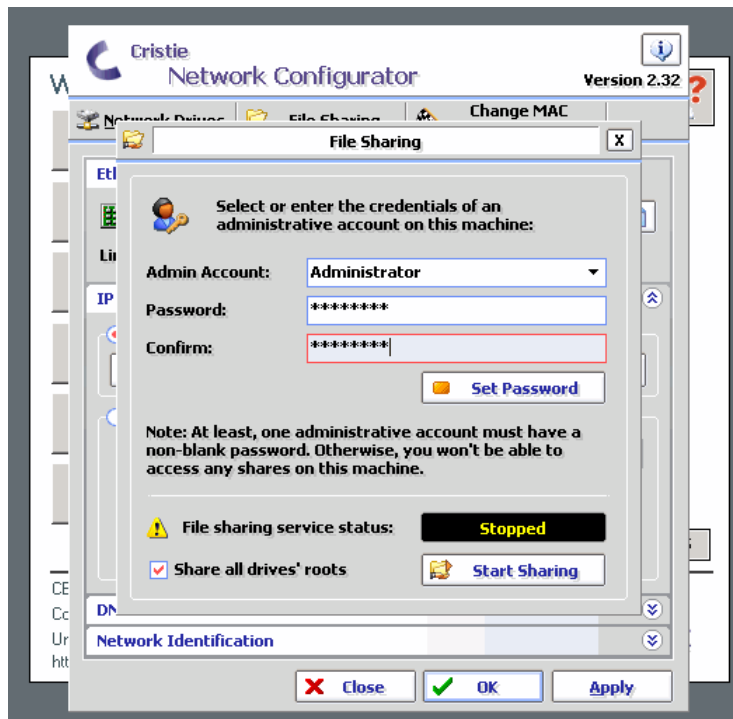
Local File Sharing

It is possible to allow local drives to be shared on the network using the File Sharing feature of the Network Configurator.

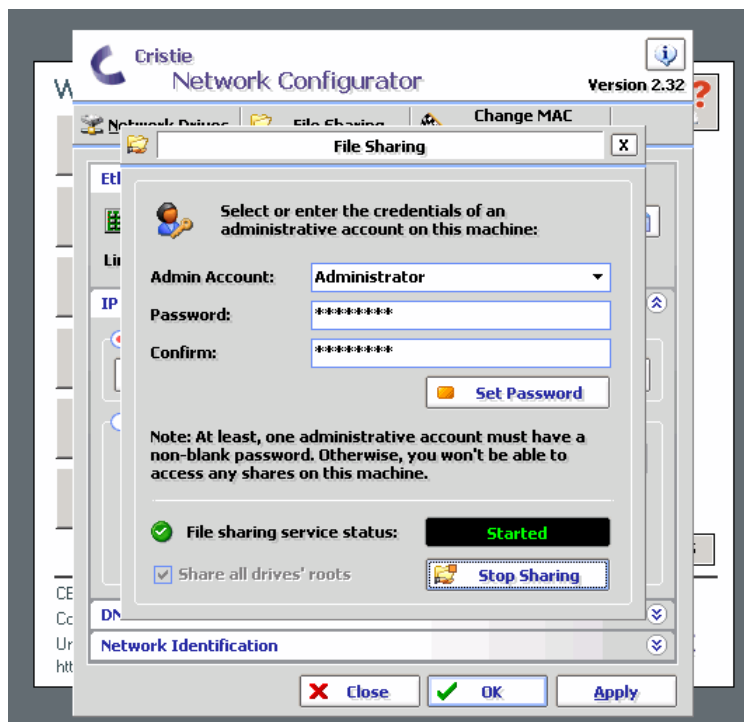


This gives you remote read/write access to any of the drives in the WinPE environment (including any of the recovered drives).

A two step process is required to enable this feature. First you must setup some remote access credentials. If users elsewhere on the network have these credentials then they may access the configured drives. Make sure you specify a non-blank password.



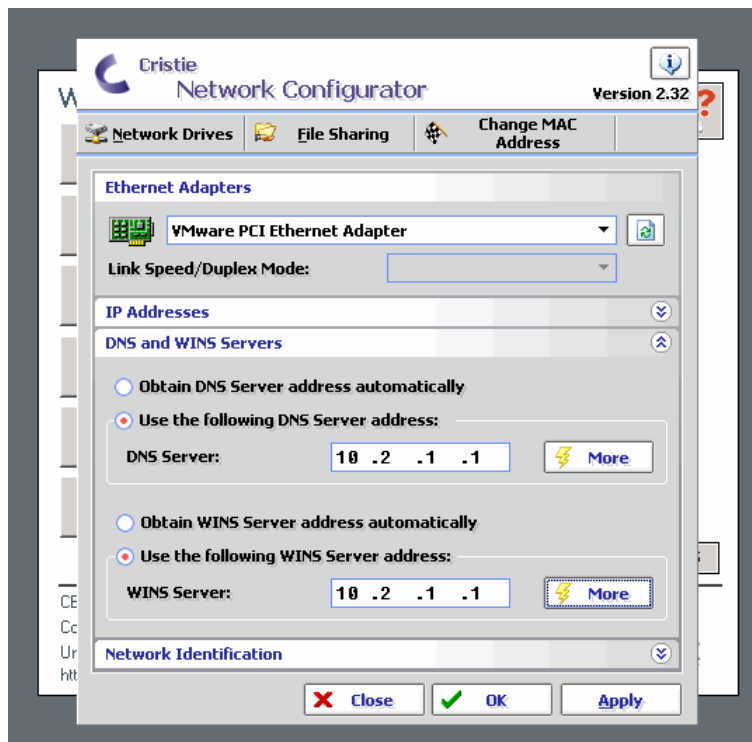
Next start the file sharing service by clicking the **Start Sharing** button.



Click on the  icon to exit this dialog and return to the main Network Configurator menu.

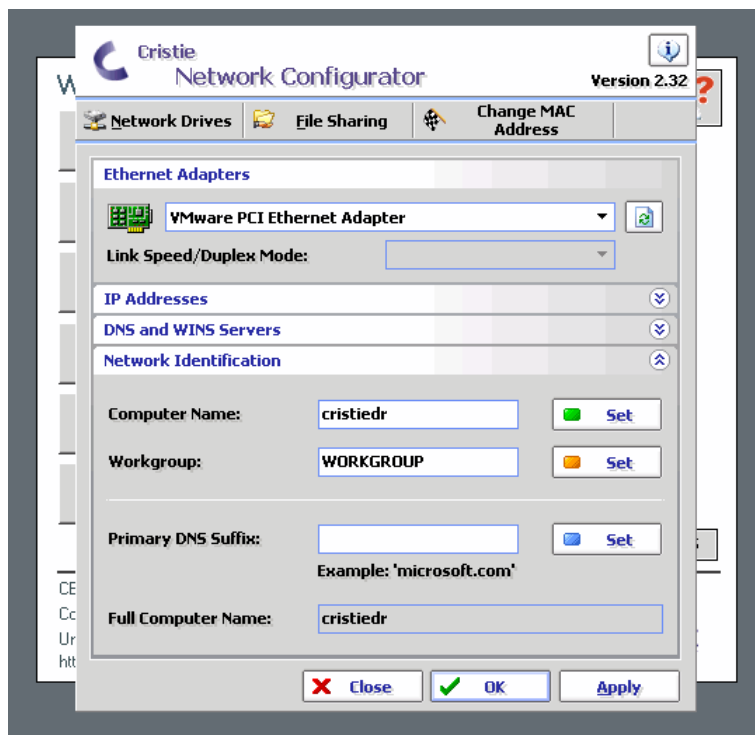
Setup DNS And WINS Servers

Using this option allows DNS and WINS server IP addresses to be set for the WinPE environment.



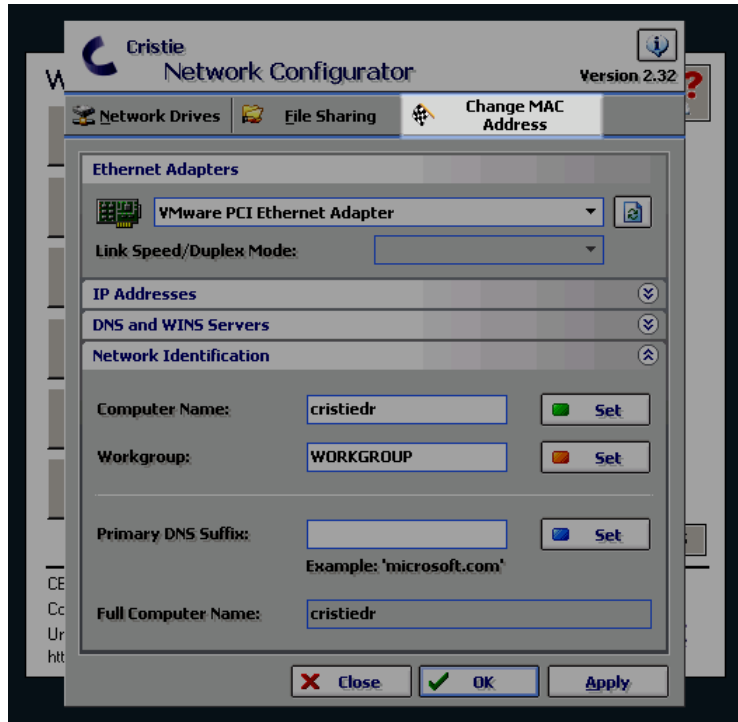
Setup Network Identification

It is possible to setup the Network Identification of the recovering system. This allows the WinPE hostname and workgroup to be changed during a DR session. These details are transient and only apply while the WinPE DR session is running. They are not applied to the recovering system when it reboots after the DR session.

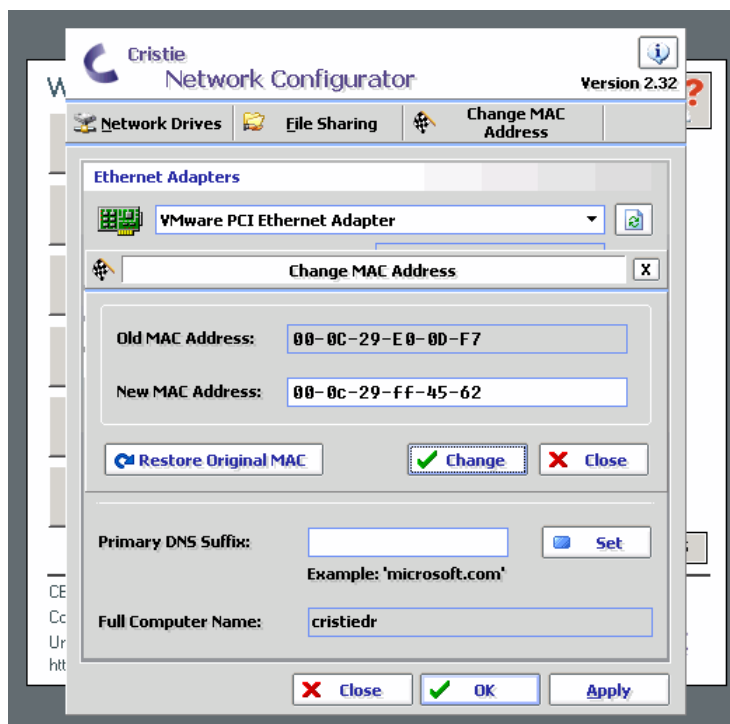


Change MAC Address

It is possible to change the local MAC address of the recovering system. Select the Change MAC Address button. Note that the new MAC address is transient and only apply while the WinPE DR session is running. They are not applied to the recovering system when it reboots after the DR session.



This results in the following display.



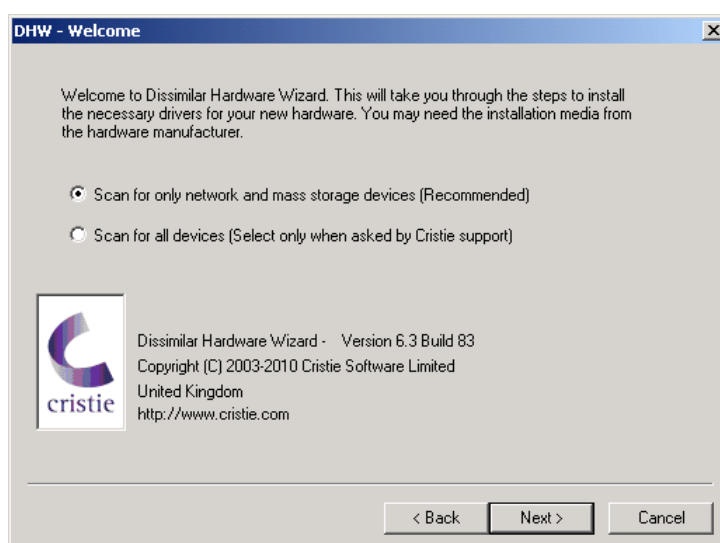
Note that the original MAC address can be restored at any time.

Dissimilar Hardware Wizard

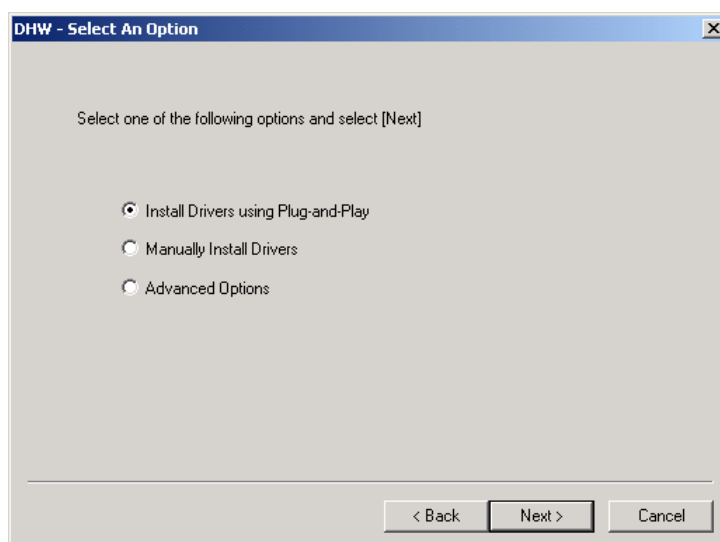
A restore to dissimilar hardware is normally detected during the Automatic or Manual DR sequence and drivers will be injected automatically at the end of the restore sequence if a source location has been provided. However, if this process has failed for some reason or additional drivers are required to be injected into the recovering machine then this Dissimilar Hardware Wizard tool is provided.

Note it is only necessary to load the drivers for the hard disk, NIC and rarely the HAL. Drivers for the hard disks and NIC can be determined by Plug-and-Play (PnP) and may be readily identified. However changes required in the CPU model via a change in HAL, cannot yet be determined by PnP; these need to be loaded manually.

If you wish to scan for just Mass Storage and Network devices (the minimum required to boot a dissimilar system) select **Next>** to continue to the next step of the Wizard. This is the recommended option. Under the guidance of Cristie Support you may be asked to scan for all devices. In this case tick the "Scan for all devices" box before selecting **Next>**.

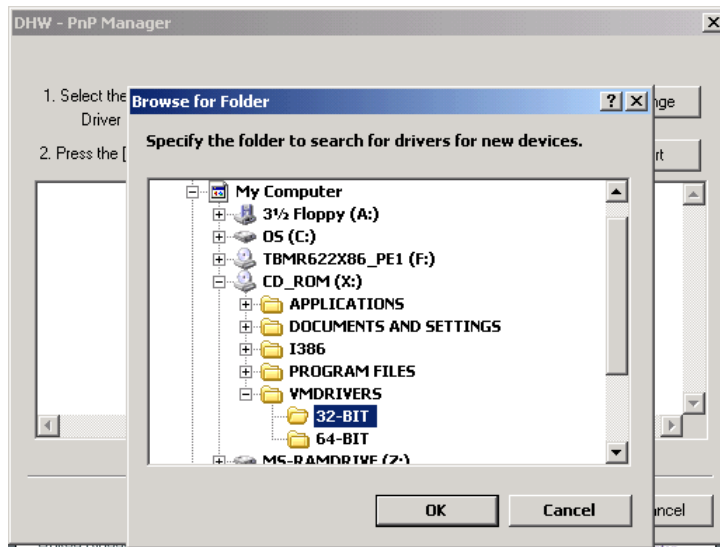


Select the Install Drivers using Plug-and-Play option.



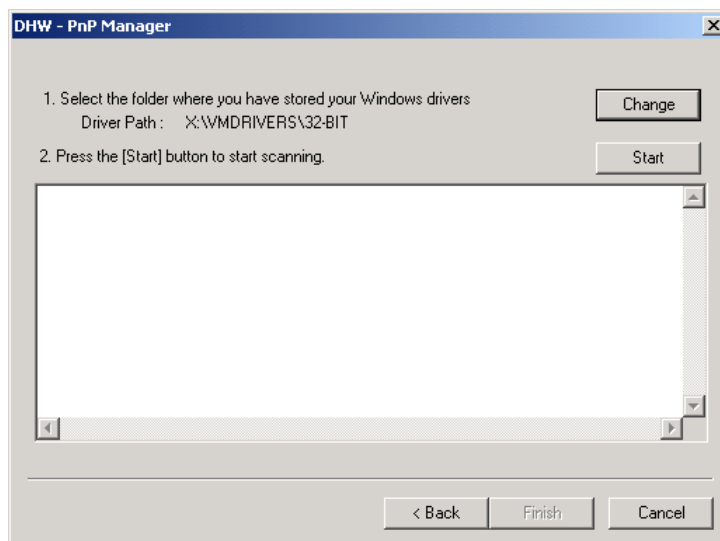
Install Drivers using Plug-and-Play

The window appears empty to start with. The set of drivers located on the recovery CD is the default choice, but in practice they should not be used. Instead change the driver search path to where you have actually located your drivers (for example, to a network share or another CD) with the **Change** command button.

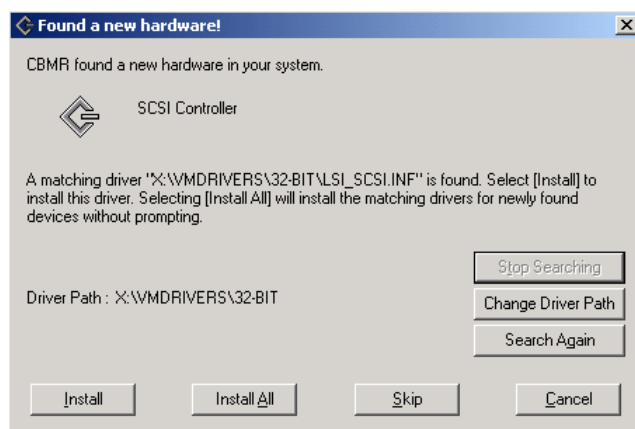


In the example above the driver search path is changed to the VMware drivers on the WinPE boot CD.

Begin the PnP driver detection by clicking **Start**.



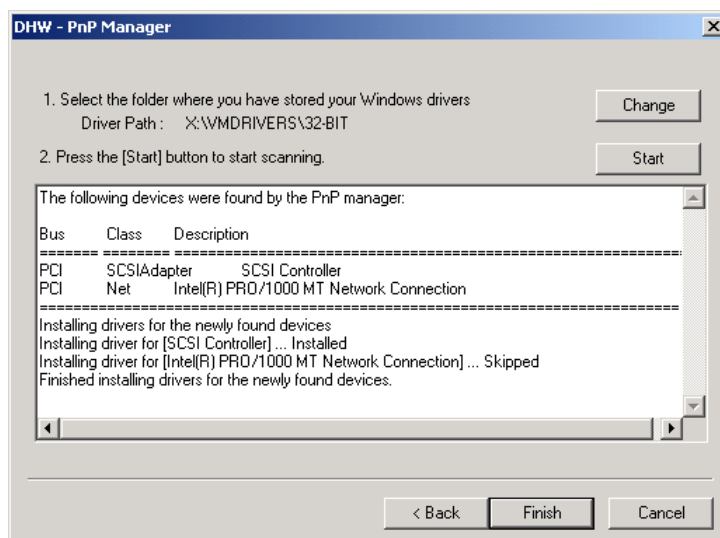
The process checks the devices that it can detect and when it finds one that does not have a driver loaded, it will offer to install it. The example below shows an LSI SCSI device being detected.



If you are satisfied that the found driver path is correct, click on **Install** and the driver will be installed. The device scan will continue and may find for example other mass storage or network devices. Follow the steps above to install as shown in the example above.

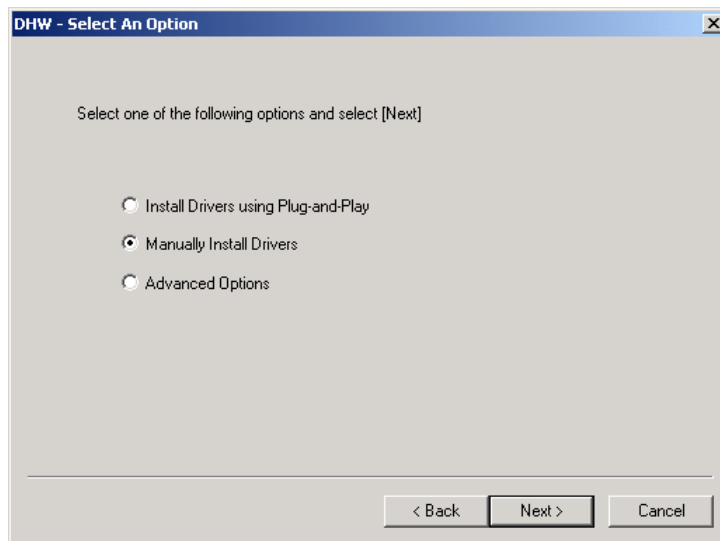
Drivers are usually .sys files. The .inf files define which driver files need to be loaded for a given device. You may need to confirm the location of the driver files for each device, or possibly find the path where they are stored. When you have the correct path, click on **OK** and the wizard will look for more.

Once all of the drivers of the detected devices have been processed, the wizard will indicate that the installation has finished. Click on **Finish** to proceed.

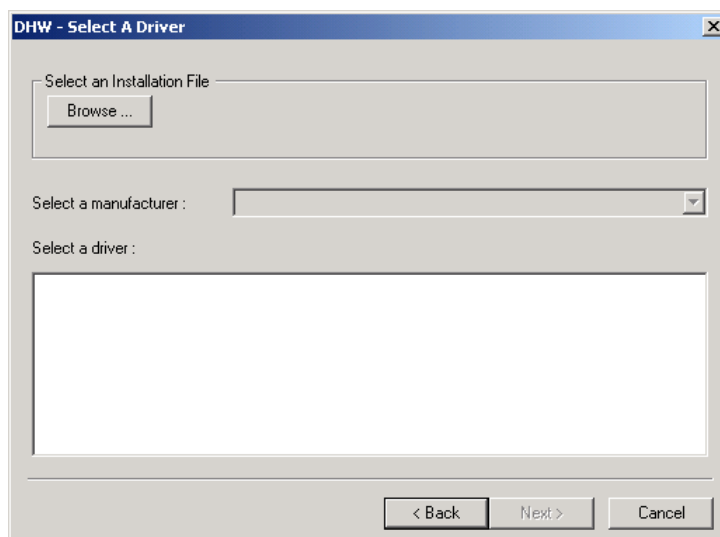


Manual Installation

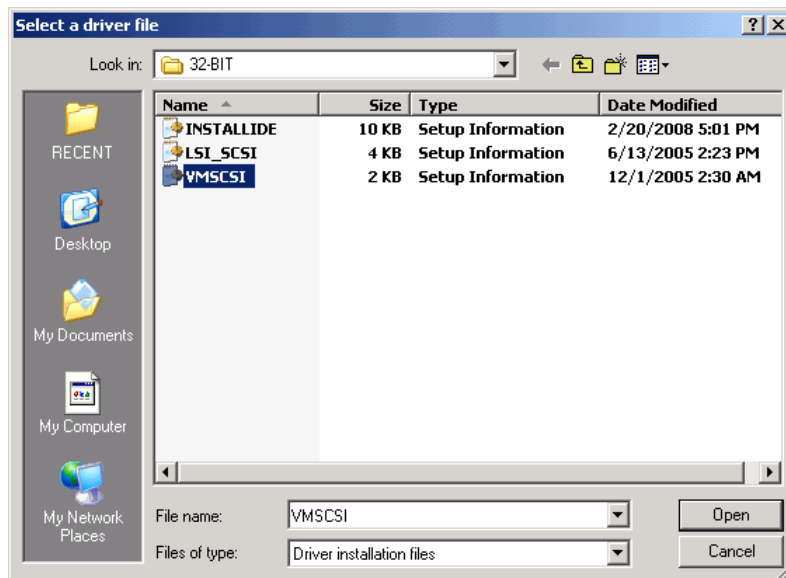
Normally you would only manually install a driver for a CPU/HAL change. Select *Manually Install Drivers* from the option menu



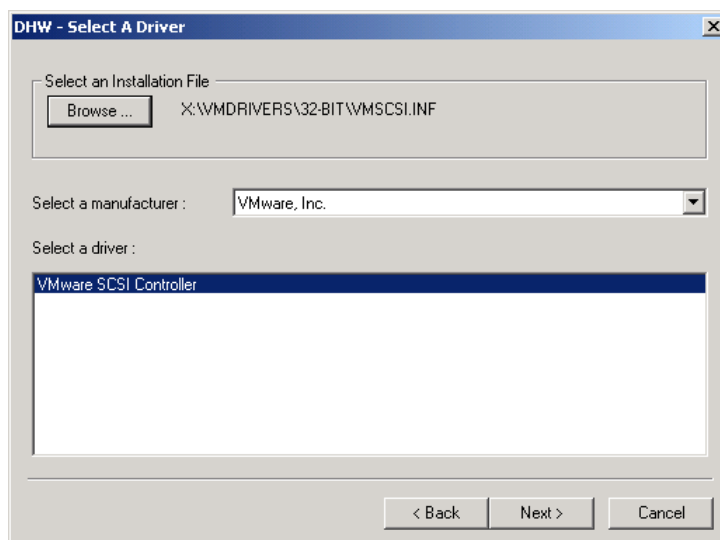
Then select **Next>**.



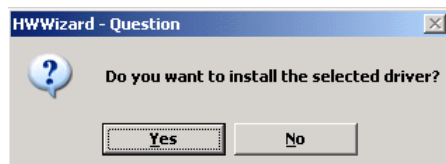
Select **Browse...** to locate the driver or HAL file you need by browsing to the appropriate folder that holds the .inf file. If you need to load the driver from another machine, then you can browse to a share on that machine and then to the appropriate folder.



Here we are selecting the VMware SCSI controller driver.

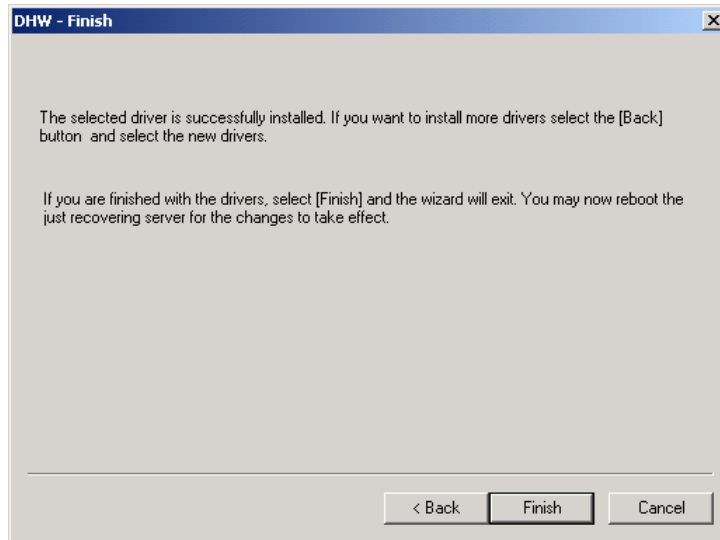


The wizard allows you to select drivers that are grouped by manufacturer. Select the actual driver that you wish to install and click **Next>**.



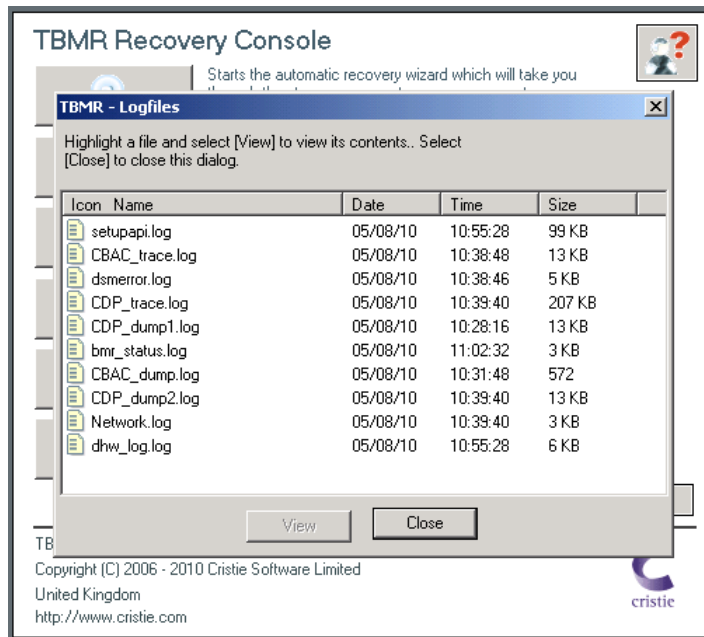
After you confirm the selection, the wizard determines which files need to be installed. You are given the opportunity to change the location from which they are loaded if required..

When the drivers have been installed, the wizard allows you to go back to install another device driver or finish the process.



8.4.2 Show Log and Error Reports

This main menu option allows the log files produced during the recovery to be viewed using notepad. Normally viewing this information is only required to diagnose a problem with the recovery.



bmr_status.log - restored disk and registry configuration log, e.g. disks/partitions created summary etc.

cbac_dump.log - contains a summary of the TSM client/server versions and node details.

cbac_trace.log - contains a detailed summary of the TSM client/server communications. Used by Cristie Support for diagnosing TSM interface problems.

cdp_dump1.log - contains general information regarding the system BIOS, disk configuration and timezone details of the original system.

cdp_dump2.log- contains general information regarding the system BIOS, disk configuration and timezone details of the target system.

cdp_trace.log - contains a detailed summary of how the partitions were restored. Used by Cristie Support for diagnosing disk configuration problems.

dhw.log - contains a summary of Dissimilar Hardware Wizard activities. Used by Cristie Support for diagnosing new driver problems.

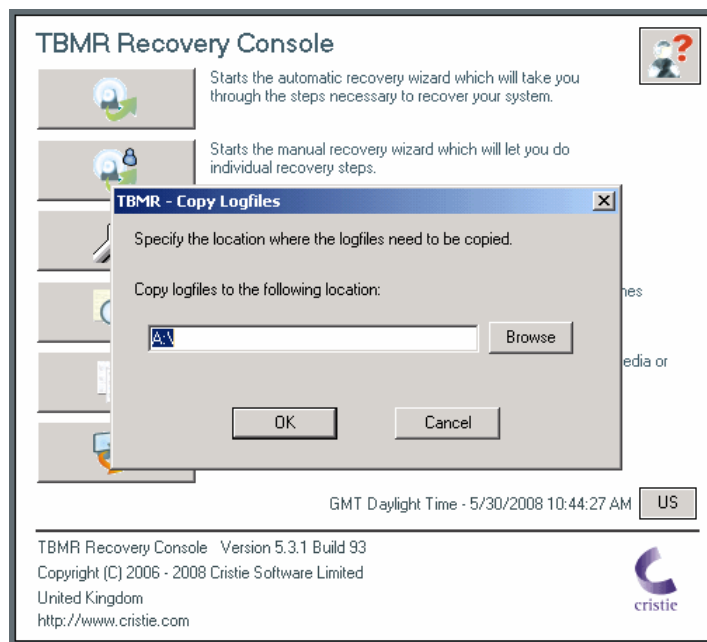
dsmerror.log - TSM interface log information

network.log - contains NIC hardware summary, current network configuration (e.g. IP address, gateway IP address etc.) and routing table.

setupapi.log - contains a summary of the Plug and Play devices detected by WinPE as it boots. Used by Cristie Support for diagnosing WinPE driver problems.

8.4.3 Copy Log and Error Report Files

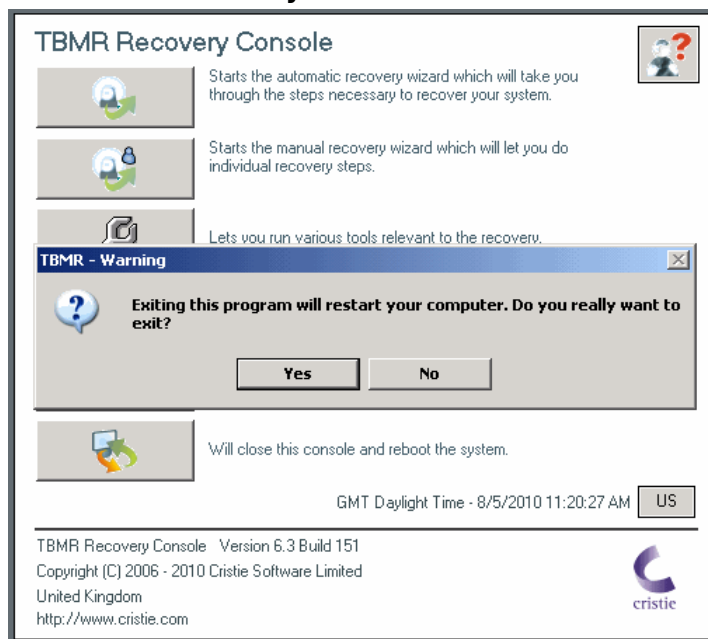
Since all log and error files generated during the recovery are only transitory (i.e. they are lost as soon as the Windows PE environment exits), this option allows you to copy the to a local device or remote network share for permanent record. Use the Cristie Network Configurator Tool , <http://www.cristie.com> to setup a network share.



The example shows files being copied to a local floppy drive.

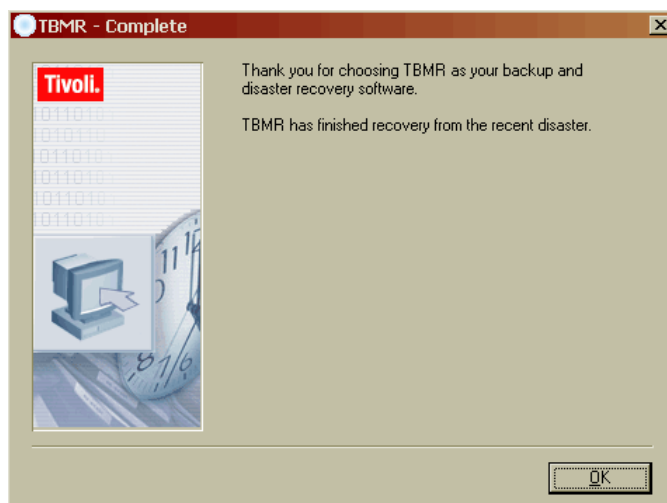
Note that the logs are automatically written back to the recovered system after a successful DR. They are saved to the TBMR installation sub-folder *Temp*.

8.4.4 Close Recovery Console and Reboot



After a successful recovery, select this option to exit the Windows PE environment and boot the recovered system.

Press **Yes** to the restart confirmation warning or **No** to continue running the DR console. If you choose to reboot the recovered Windows system will start.



The above dialog is displayed when the recovered system re-starts and shows the successful completion of the Disaster Recovery.

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